ORDER

6110.6

PROJECT IMPLEMENTATION PLAN
PERIPHERAL ADAPTER MODULE REPLACEMENT ITEM

JuLY 27, 1990

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Distribution: A--W (BU/MS/LR/NA/NR/NC) -1;
A-w (LG/NS/SM/RD/PM/TR/SE/HR/HT0 -2;
A-W (AP) -3; A-X (AF/AT/LG/RM) -2; A-Z (CN/CD) -2;
A-Y (AY/DE/FA) -2; A-FAF-3 (2 cys ea.)
A-FAT-1 (2cys ea.)

Initiated By: AAP-240

RECORD OF CHANGES

DIRECTIVE NO. 6110.6

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL

FOREWORD

This order transmits the Project Implementation Plan (PIP) for the Peripheral Adapter Module Replacement Item (PAMRI) subsystem of the Advanced Automation System; provides guidance and direction for the orderly implementation of the PAMRI at the 20 air route traffic control centers within the continental United States; and establishes the plan for program management of project implementation, and responsibilities governing the required activities to ensure that the PAMRI is properly introduced into the National Airspace System. This order is addressed to all personnel involved in the Advanced Automation System implementation at the 20 air route traffic control centers within the continental United States.

Michael E. Perie
Program Manager for Advanced Automation

TABLE OF CONTENTS

Page No.

Page No.

CHAPTER 1. GENERAL

1. PURPOSE. This order sets forth the FAA management and technical guidance for implementing the Peripheral Adapter Module Replacement Item (PAMRI) portion of the Advanced Automation System (AAS). It is to be used for all technical and resource planning activities concerned with PAMRI implementation.

2. DISTRIBUTION. This order is being distributed to director level in the Offices of Budget, Management Systems, Labor and Employee Relations, and the Program Directors for Automation, Surveillance, and Communications; division level in the Logistics, NAS Transition and Implementation, Systems Maintenance, Research and Development, NAS Program Management, Air Traffic Plans and Requirements, and NAS System Engineering Services and the Offices of Human Resource Management and Training and Higher Education; branch level to the Program Manager for Advanced Automation; division level to regional Air Traffic, Airway Facilities, Logistics, and Resource Management Divisions; division level to the Engineering, Test, and Evaluation and the Engineering, Research and Development Services at the FAA Technical Center and the Facility Support, FAA Academy, and the FAA Depot at the Aeronautical Center; and to Air Route Traffic Control Centers for Airway Facilities and Air Traffic field offices.

3. DEFINITIONS. The definitions of terms, acronyms, and abbreviations used in this document, may be found in appendix 1.

4. AUTHORITY TO CHANGE THIS ORDER. The Program Manager for Advanced Automation, AAP-1, has the authority to make changes to this order.

5. SCOPE. The scope of this order covers all aspects of PAMRI implementation at 20 Continental United States (CONUS) air route control centers (ARTCC) beginning with site surveys, site preparation, and ending with equipment removal and disposition of replaced equipment. The technical and management data contained in this PAMRI Project Implementation Plan (PIP) is applicable at all 20 ARTCC's. The location of the PAMRI at the Houston and 9020E ARTCC's is to be determined by the regions and facilities with support from the Implementation Branch, AAP-240. PAMRI implementation requirements and activities at the FAA Technical Center (ACT) and Mike Monroney Aeronautical Center (AAC) are addressed in other documents.

6.- 19. RESERVED.

CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS. The PAMRI is to be implemented at the CONUS ARTCC's, the FAA Academy and FAA Technical Center. The PAMRI is to be the first element of the initial sector suite system (ISSS) installed. Deployment of PAMRI provides for the removal of the existing Peripheral Adapter Modules (PAM), the Radar Data Acquisition Subsystem's (RDAS), the Data Receiver Group (DRG) and the Radar Multiplexer (RMUX) portion of the Enhanced Direct Access Radar Channel (EDARC). PAMRI also provides the capability for expansion of the existing interfaces and reduces the problems encountered with transition between the existing system and the ISSS. The PAMRI will be installed while the PAM's, DRG's and RMUX are operational. A planned transition procedure will be used to effect the transfer.

21. PURPOSE. The purpose of the PAMRI project is to provide the hardware and software needed to accomplish the objectives listed in paragraph 20.

22. HISTORY. In December 1981, the FAA chartered a comprehensive National Airspace System (NAS) Plan for modernizing and improving air traffic control and airway facilities services through the year 2000. The plan calls for incremental modernization of the existing system. The first step provided the Host Computer System (HCS) to replace the 9020 A/D's. The HCS provided the increased capacity needed to meet the expanding demand on the air traffic system. The HCS replaced all components of the 9020 A/D's except the PAM's. The PAM's were scheduled to be replaced in the 1993-1995 timeframe by the AAS program.

a. In June 1986 a memo from ATR-1 to AAP-1 expressed Air Traffic's concern about the PAM's and the capabilities of the PAM's to support transition, expansion, and maintainability until the 1993-1995 timeframe.

b. As a result of this memo, the decision was made to replace the PAM's and DRG's. The DRG's were included because of the age of the equipment and the limiting factor of a 15 radar capability. Replacement of the RMUX was a contractor option. The contractor has opted for replacement.

22.1 PAM Replacement. System Level Specification (SLS) FAA-ER-130-005H-AP, SCN 010, June 16, 1987, Sec. 50 added the PAMRI requirement to the Acquisition Phase of the Request for Proposal (RFP).

23. OPERATIONAL REQUIREMENTS JUSTIFYING PAM REPLACEMENT.

23.1 HCS/PAM to ISSS/Common Console Transition. The existing operational program requires two PAM's for operations. This precludes high activity testing and training on the ISSS. Testing limited to low activity only provides a low level of confidence and does not thoroughly check the system. Replacement of the existing PAM's with a configuration that has full redundant capabilities expedites cutover, testing, and training.

23.2 Maintenance Operational Problems. The PAM's are becoming more of a maintenance problem because of the age of the equipment. If not replaced prior to full AAS, the performance of the PAM's may become a severe maintenance and operational problem.

23.3 Operational Expandability. Expansion of new interfaces into an ARTCC is very difficult or impossible due to the unavailability of adapters and ports. New PAM's provide expansion capability.

24. DATA RECEIVER GROUP (DRG) REPLACEMENT. The DRG consists of the data receiver group and display console unit. The equipment was installed as a part of the RDAS when NAS en route stage A was installed in the early 1970's. The DRG supports 15 radars only. The PAMRI capabilities allow expansion to 25 radars.

25. RADAR MULTIPLEXER (RMUX) REPLACEMENT. The RMUX was installed as the interface between the DRG and the Direct Access Radar Channel (DARC) in the 1970's. The contractor has opted to replace the RMUX rather than interface with the existing cabling. The replacement RMUX has the capability to interface with 25 radars.

26.-29. RESERVED.

CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION. The connectivity of the existing PAM/DRG/RMUX is shown in figure 30-1.[1] The three units are functionally and physically independent of each other. The PAMRI replaces each system. Figure 30-2[2] PAMRI architecture shows the end state design of the PAMRI.

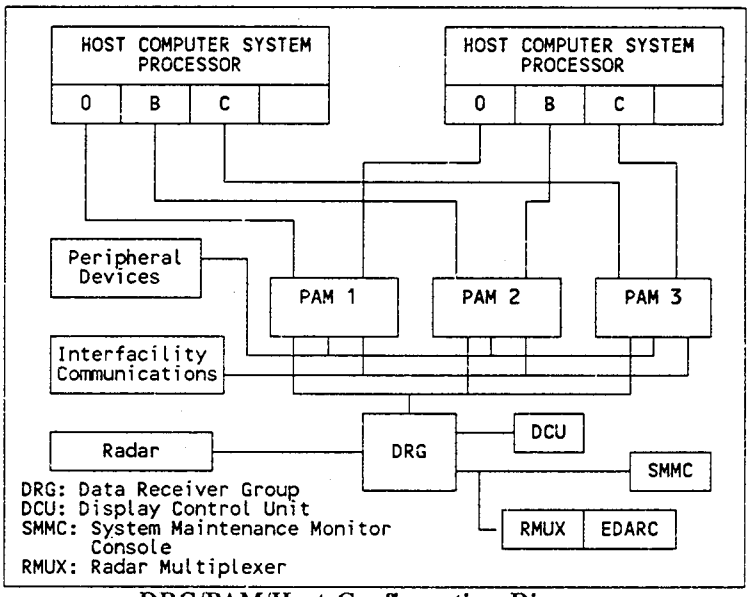
30.1 Adapter Units (AU). The AU's replace the functional role of the existing PAM's. The function of the AU's is to provide controls and interfaces which permit on line attachment of multiple input/output (I/0) devices to the HCS. The I/0 devices can be located local and/or in remote areas. Typical interfaces are radar, interfacility communications, Flight Data Input/Output (FDIO), etc. The PAMRI consists of two identical functional elements. Each functional element is connected to both host processors through four byte-multiplex channels O, B, C, D.[3] During system operation one functional element (2 AU's) is operational. The other functional element is non-operationally redundant. Selection of the operational and non-operational redundant functional elements is under control of the NAS operational software executing on the primary processor of the HCS.[4]

30.2 Radar Data Distribution Unit (RDDU). The RDDU provides the functional replacement for the DRG's and RMUX.

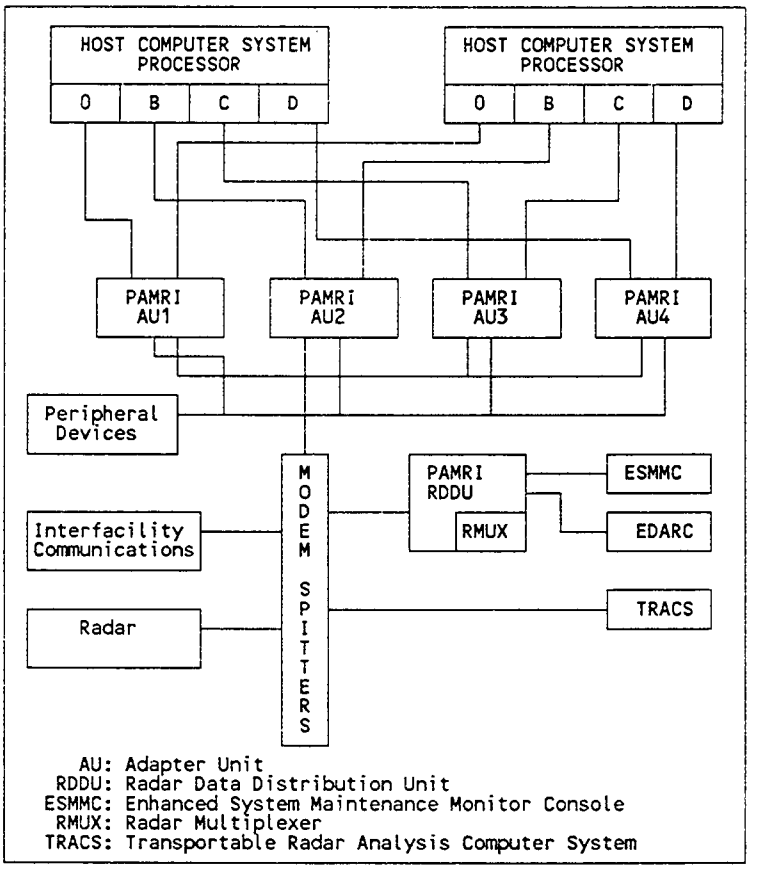
30.2.1 DRG Replacement. The RDDU receives radar inputs directly from the modem splitters. The data is selectively distributed to support systems. The RDDU monitors all radar input channels.

30.2.2 RMUX. The function of the RMUX is to accept data from the DRG, multiplex the data into a serial stream and transmit it to the Display Processor Units (DPU) of the EDARC for use in developing the backup data for the prime NAS radar data processing channels. The RDDU incorporates this function.

30.3 Maintenance Console. The PAMRI has three (3) maintenance consoles, one (1) for each AU and one (1) for the RDDU. The maintenance console provides all of the functions normally allocated to a typical maintenance panel. Additionally, the RDDU maintenance console provides all the functions currently allocated to the Display Control Unit (DCU)



DRG/PAM/Host Configuration Diagram
Fig. 30-1

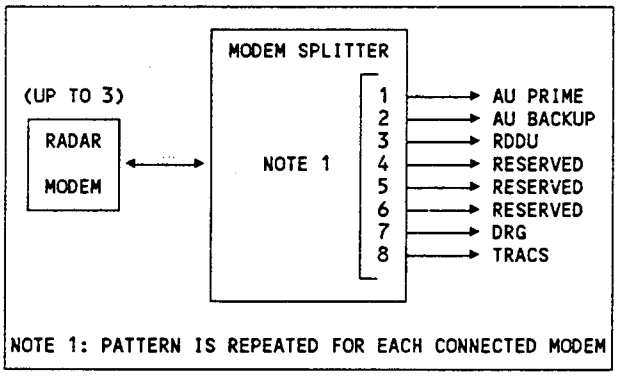


PAMRI Architecture
Fig. 30-2

Random Access Plan Position Indicator (RAPPI) of the Data Receiver Equipment (DRE). The console is a standard IBM PS/2 Model 55. Each PS/2 is shipped with a maintenance diskette and the associated documentation. In addition, the PS/2 performs an automatic power on self test every time power is applied to the unit; all diagnostics residing on the maintenance diskette are executed on each PS/2 as part of the incoming tests.[5] The PS/2, printers and processors are installed on tables next to the RDDU and AU racks.

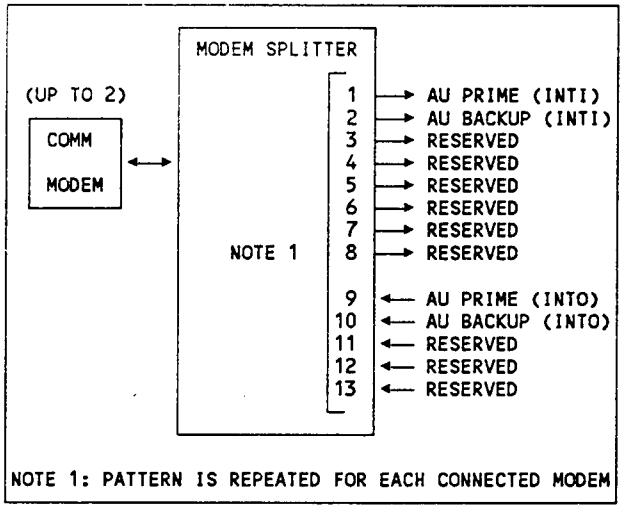
30.4 Modem Splitter. The function of the modem splitter is to convert input signals (radar and communications) to matching output signals, and to provide multi-input and/or multi-output ports as applicable.

30.4.1 Radar Modem Splitters. The radar modem splitters provide the capability for eight (8) outputs for each input radar channel. Each radar modem splitter allows for three (3) modem channels to be connected. Figure 30-3 shows a typical radar modem splitter configuration.[6]



Typical Radar Modem Splitter
Fig. 30-3

30.4.2 Communications Modem Splitters. The communications modem splitters provide eight (8) output channels and five (5) input channels for each modem splitter. Each communications modem splitter allows two (2) communications modems to be connected. Figure 30-4 shows a typical communications modem splitter configuration.[7]



Typical Communications Modem Splitter
Fig. 30-4

30.5 Functional Independence. The AU's and RDDU's remain functionally independent of each other and could be installed as independent projects.

31. PHYSICAL DESCRIPTION. Figure 31-1 provides the physical characteristics of the PAMRI cabinets.

31.1 PAMRI Basic Cabinet.

a. Electromagnetic Interference (EMI) Design
Gasketing.

b. Cable opening
Bottom access.

c. Mounting rails
Electronic Industries Association (EIA) 19 inch Std - cabinet front.

d. Cooling
Fans in base of each Communications Interface Unit (CIU)/nest assembly.
Fans in base of M.S. racks.

e. Convenience Outlets
Front and rear at base.

f. Door locks
Rear door only.

32. SYSTEM REQUIREMENTS. The PAMRI architectural, mechanical, and electrical requirements

Unit	No. Units	Weight	Height	Width	Depth	Load/SQ FT
Adapter Units	4	750 lbs MAX	79.0"	24.00"	36.00"	82.4 lbs
RDDU	1	750 lbs MAX	79.0"	24.00"	36.00"	82.4 lbs
Modem SP	2	600 lbs MAX	79.0"	24.00"	36.00"	69.9 lbs
PS/2	3	39 lbs MAX	19.5"	14.50"	17.00"	30.8 lbs
Printer	3	15 lbs MAX	6.0	21.5"	15.00"	15.0 lbs
Table	3	105 lbs MAX	27.0	48.0"	30,00"	10.0 lbs

PAMRI Physical Description
Fig. 31-1

for site preparation are defined in the following subparagraphs.

32.1 Space. Floor space required for each of the permanent racks and maintenance console tables are shown in figure 31-1. Figure 73-1 shows the modem splitters. Figure 73-2 shows the AU racks and maintenance console tables. Figure 73-3 shows the RDDU rack and maintenance console table. The maintenance console table must be located within 19 cable feet of the unit it serves.

32.1.1 Modem Splitter Rack Location. The modem splitters are to be installed adjacent to the data multiplexer (DMUX) or as close as possible. The modem splitters are not end state items.

32.1.2 AU Rack Location. NCP 11198 was approved April 21, 1989, showing the total PAMRI installation in the automation wing basement directly in front of the DMUX. The AU's are no longer end state items but they should be installed as close to the designated area as possible or within 50 feet of the DMUX. They should not be installed where other end-state equipments will be installed prior to removal of the AU's when the Area Control Computer Complex (ACCC) is commissioned. Site surveys will determine the final location.

32.1.3 RDDU Rack Location. The RDDU is functionally independent of the Host and is not an end state item. It is recommended that the RDDU be installed adjacent to EDARC. It should not be installed where other end-state equipments are to be installed prior to removal of the RDDU when ACCC is commissioned. Site surveys will determine the final location.

32.1.4 Raised Floors. The raised floor that exists in the automation wing basement may require modification. This data is to be available by the first site survey 12 months prior to equipment delivery or sooner.

32.1.5 Sound Control. There are no requirements for additional sound control for the PAMRI installation.

32.2 Cooling Requirements. Figure 32-1 provides the cooling requirements.

32.3 Electrical. The electrical requirements for the PAMRI are defined in paragraphs 32.3.1, 32.3.2, and 32.3.3.

32.3.1 Critical Power. Figure 32-2 provides critical power loading.

32.3.2 Power Non-Critical. Circuits are required for convenience outlets as shown in figure 32-2.

32.3.3 Transition Switch Power. See Chapter 7, Site Preparation, for transition switch requirements.

		Heat Dissipation		Air Requirements	
Unit	No. Units	Unit Heat KW	Total Heat KW	Unit CFM	Total CFM
AU	4	1.5	6.0	300	1200
RDDU	1	1.1	1.1	300	300
M.S.	2	0.7	1.4	300	600
PRINT	3	0.1	0.3	10	30
PS/2	3	0.2	0.6	25	75

Cooling Requirements
Fig. 32-1

		Est. Critical Power		208V S.P. 60 HZ Circuits	
Unit	No. Units	KVA/Unit	KVA Total	Per Cabinet	Total
AU	4	2.1	8.4	# 2-15A	8
RDDU	1	2.0	2.0	2-15A	2
M.S.	2	1.7	3.4	2-15A	4
Printer	3	0.2	0.6	## 115v S.P.	3
PS/2	3	0.5	1.5	-	-
CONV. OUTLETS	2 ea	AU, Racks 120v 15amp S.P. Service Bus			
CONV. OUTLETS	1 ea	M.S. Racks 120v 15amp S.P. Service Bus			
CONV. OUTLETS	1 ea	RDDU Rack 120v 15 amp S.P. Service Bus			

\# Power to the cabinets are from separate feeders.
\## PS/2 and Printer on same circuit.

Critical Power
Fig. 32-2

33. INTERFACES. The following paragraphs describe the PAMRI interfaces. Figure 33-1 lists the number of adapters for each site.

33.1 General Purpose Input (GPI) Interface. The GPI interface provides a replacement interface for the existing PAM GPI adapter. The GPI interface provides an input medium for various devices to send and control data to the Host processor.

a. The GPI interface accepts data from the attached device in a parallel format on a demand/response basis initiated by the device. The GPI interface is capable of accepting eight-bit bytes plus odd or even parity, as determined by the attached device. Data is presented to the HCS processor as eight-bit bytes plus parity in parallel format.[8]

b. Each GPI interface accommodates a device that is capable of transferring data up to 40,000 bytes per second. The maximum number of GPI interfaces is 30.[9]

c. The GPI adapters interface with the following external systems: EDARC, system maintenance monitor console (SMMC), coded time source (CTS), FDIO, non-radar keyboard (NRKM), national data interchange network (NADIN), and APOLLO.

33.2 General Purpose Output (GPO) Interface. The GPO interface provides a replacement interface for the existing PAM GPO adapter. The GPO interface provides an output medium for various devices to receive and control data from the HCS processor.

a. The GPO interface presents data to the attached device in a parallel format on a demand/response basis initiated by the device or Host. The GPO interface is capable of presenting eight-bit bytes plus odd or even parity, as determined by the attached device.[10]

b. Each GPO interface accommodates a device that is capable of transferring data up to 40,000 bytes per second. The maximum number of GPO interfaces is 30.[11]

SITE	GPI	GPO	INTI	INTO	#CD	##SIM
1. ZSE	16	18	14	14	39	0
2. ZTL	16	16	32	32	39	0
3. ZAU	16	18	27	27	30	0
4. ZFW	16	16	21	21	60	0
5. ZOB	16	18	26	26	33	0
6. ZHU	16	18	25	25	45	0
7. ZDV	16	16	15	15	42	0
8. ZDC	18	18	36	36	33	0
9. ZLC	16	20	15	15	60	0
10. ZNY	16	16	19	19	30	0
11. ZKC	18	18	22	22	48	0
12. ZMP	16	16	28	28	48	0
13. ZAB	16	16	19	19	60	0
14. ZOA	16	16	28	28	45	0
15. ZME	16	16	21	21	42	0
16. ZLA	16	16	35	35	42	0
17. ZMA	16	22	19	19	39	0
18. ZID	16	18	23	23	27	0
19. ZJX	16	16	32	32	39	0
20. ZBW	16	16	22	22	36	0
ATC No. 1	30	30	50	50	75	16
ATC No. 2	30	30	50	50	75	16
ATC No. 3	30	30	50	50	75	16
FAA Academy	15	15	6	6	18	0

\# The CD column indicates the number of radar adapter Channels (3 per radar).
\## Looped-SIM Interface Channels

Revised Interface Requirements (per subsystem)
Fig. 33-1

c. The GPO adapters interface with the following systems: EDARC, SMMC, FDIO, NRKM's, MSP's, NADIN, APOLLO and Customs.

33.3 Interfacility Input (INTI) Interface. The INTI interface provides a replacement interface for the existing PAM INTI adapter. The INTI interface meets the interface requirements of the existing interfacility modems. The INTI interface receives eight-bit bytes plus odd parity serially from a modem operating at 2400, 4800, 7200, 9600, 14,400, or 19,200 bits per second and assembles the data into eight-bit bytes plus odd parity for parallel transfer to the HCS processor.[12]

a. Each INTI interface can accommodate a modem that is capable of transferring data up to 19,200 bits per second. The maximum number of INTI interfaces is 50.[13]

b. The INTI adapters interface with the following systems: automated radar

terminal system (ARTS), adjacent ARTCC's and central flow control.

33.4 Interfacility Output (INTO) Interface. The INTO interface provides a replacement interface for the existing PAM INTO adapter. The INTO interface meets the interface requirements of the existing interfacility modems. The INTO interface receives eight-bit bytes plus odd parity from the HCS processor in parallel form and transfers the data bit serially to a modem operating at 2400, 4800, 7200, 9600, 14,400, or 19,200 bits per second.[14]

a. The INTO adapters interface with the following systems: ARTS, adjacent ARTCC's, and central flow control.

b. Each INTO interface can accommodate a modem that is capable of transferring data up to 19,200 bits per second. The maximum number of INTO interfaces is 50.[15]

33.5 Radar Interface. The radar interface replaces the Common Digitizer (CD) adapter. Each radar interface is capable of transferring data serially at a data rate selected by the attached modem up to a maximum of 19,200 bits per second. The maximum number of radars is 25.[16] The PAMRI provides a replacement for the following existing DRG interfaces:[17]

a. From the DRG to the PAM CD adapters.

b. From the DRG to the EDARC.

c. From the DRG to the SMMC.

d. From the DRG to the DCU (RAPPI).

33.6 EDARC Interface. Current EDARC software provides capacity for 15 radars. ASM-400 is modifying the software to provide capacity for 24 radars in EDARC. Twenty-four is an EDARC hardware limitation. Applicable Interface Control Document: NAS-MD-742 DRG/DARC ICD.

33.7 Host Interface. The PAMRI provides a channel controlled functional interface between the HCS processor and the PAMRI using the byte-multiplexer channel.[18] The PAMRI is capable of transferring data to/from the HCS processor at the transfer rate of the byte multiplexer channel.[19]

33.8 Initial Interfaces. Figure 33-1 lists the initial number of interfaces to be supplied for each facility per subsystem. The SLS was modified by NCP 12201 to increase the number of adapters to the projected 1995 requirements.

34. TRANSITION REQUIREMENTS. The PAMRI includes any equipment necessary to effect the transition from the existing PAM's. To ensure greater availability during transition, it is possible for a limited period, until confidence is established in the new item, to operate the facility with either the PAMRI or the existing PAM's. The full operation of all interfaces is maintained at each stage of the transition.[20]

35.-39. RESERVED.

CHAPTER 4. SCHEDULES AND STATUS

40. PROJECT SCHEDULES AND GENERAL STATUS. The project schedules for PAMRI implementation are derived from the AAS Executive Summary Network (ESN) dated April 15, 1989; the AAS prime contractor requirements in accordance with the AAS System Level Specification FAA-ER-130-005H-AP dated August 28, 1987; and estimated regional site preparation time.

40.1 Executive Summary Network. The ESN is maintained and updated by the Program Manager for Advanced Automation. It is the highest level of scheduling. It is updated when there are major program adjustments.

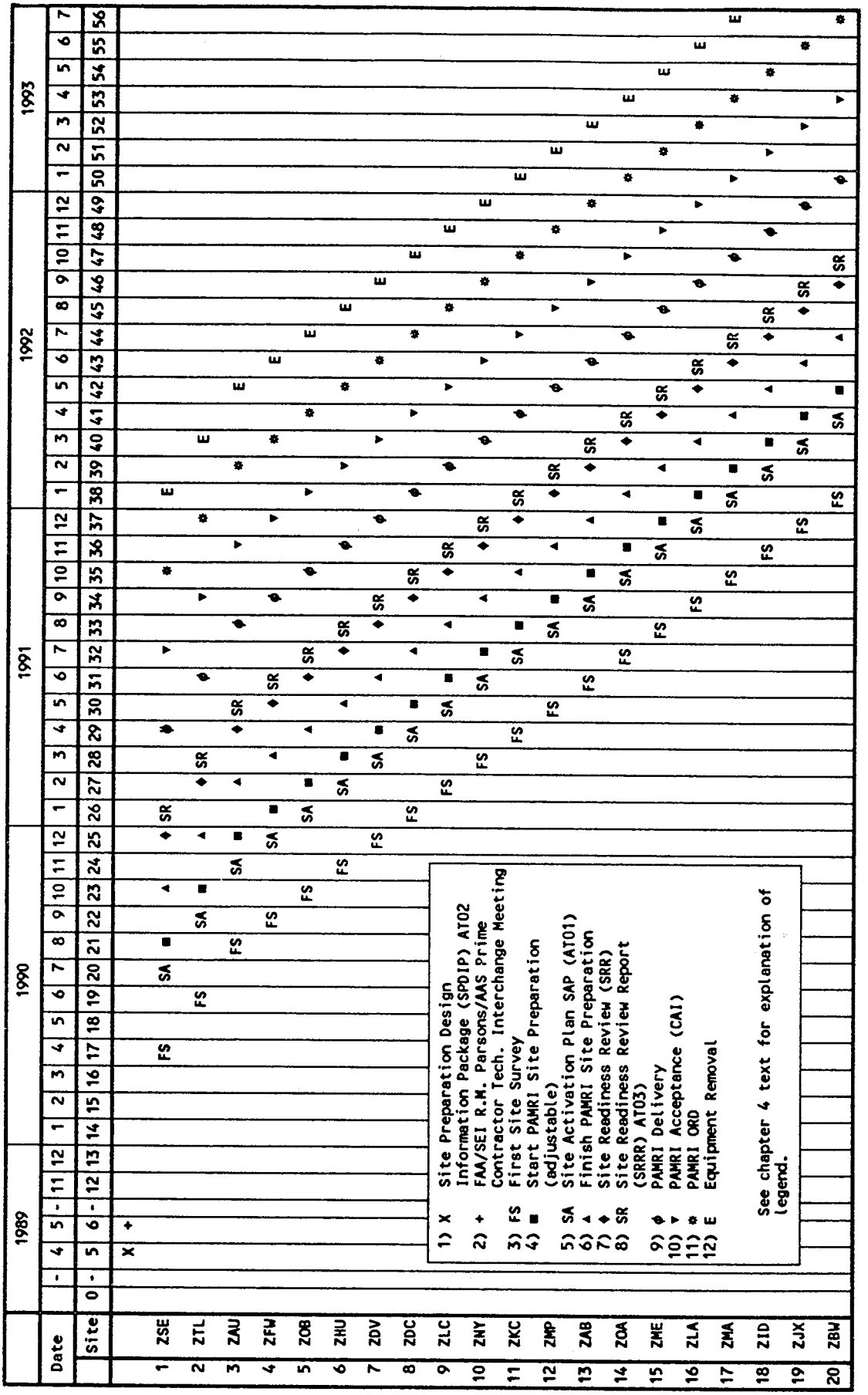
40.2 AAS Prime Contractor. The System Level Specification places certain requirements for deliverables on the AAS prime contractor. The prime contractor is responsible to meet the contractual dates or adjust them in concert with the FAA.

41. MILESTONE SCHEDULE SUMMARY. The milestones that pertain to the PAMRI project implementation are derived from the ESN as presented in paragraph 40. Figure 41-1 shows a milestone summary that is applicable to the ACT and ARTCC site one. The list shows the date for that activity with respect to the equipment contract award. The list also presents the paragraph numbers within this order that discuss the subject activity where applicable. Figure 41-2 presents a waterfall of the major milestones for each site.

MILESTONES	REL. DATE	REF. PAR
1 Contract Notice to Proceed (Date Only)	0 MAC	11/88
#2 Site Plan Design Information Package (SPDIP)	5 MAC	41.1
#3 Technical Interchange Meeting (TIM)	6 MAC	41.2
4 First Article Delivered to ACT (Production)	15 MAC	-
5 Transition Plan AT-05	16 MAC	58.3
##6 First Site Survey	17 MAC	41.3
7 System Qualification Tests Article One Completed	19 MAC	-
8 PAMRI Systems 2+3 Delivered ACT	19 MAC	-
##9 Site Activation Plan (SAP)	20 MAC	58.4
##10 Site Readiness Review (SRR)	25 MAC	41.7
11 Site Contractor Fit-Up	###	-
##12 Site Readiness Review Report (SRRR)	26 MAC	41.8/58.5
#13 Deployment Readiness Review (DRR)	28 MAC	70.00
14 OT&E ACT Completed	29 MAC	82.1.5.2
##15 Equipment Delivery	29 MAC	41.9
16 Contractor Acceptance Inspection (CAI)	32 MAC	41.10 83.2.6
17 FAA Integration Testing Completed	####	83.2.7
18 Training Completed	####	
19 Initial Operating Capability (IOC)	####	83.2.7
##20 Operational Readiness Demonstration (ORD)	35 MAC	41.11 83.2.12.3
##21 Joint Acceptance Inspection (JAI)	35 MAC	41.11 83.2.12
##22 Equipment Removal	38 MAC	83.2.11.3

\# Conducted at first site only.
\## First site dates given, see figure 41-2 for each site.
\### Date set at site survey.
\#### Determined by each site.

PAMRI Milestone List
Fig. 41-1



PAMRI Key Events
Fig. 41-2

Figure 41-2

41.1 **Site Preparation Design Information Package (SPDIP) AT02.** The AAS prime contractor is required to deliver the SPDIP 5 months after contract award. Volume IA PAMRI SPDIP was delivered April 1990. The SPDIP is a generic site design that is used for early information on the planning for each site by region and site personnel as well as headquarters and SEI. For a detailed discussion of SPDIP see paragraph 58.1.

41.2 **FAA/System Engineering and Integration (SEI) R.M.Parsons/AAS Prime Contractor Technical Interchange Meeting (TIM).** The FAA, SEI, and the AAS prime contractor participate in a TIM. The object of the meeting is to coordinate the SPDIP data and ensure that all participants understand and agree on the site preparation requirements as presented in the SPDIP. This TIM marks the start of the site specific design for the first site.

41.3 **First Site Survey.** IBM proposes to conduct the first site survey at each ARTCC 12 months prior to equipment delivery. The objectives of the survey are to:

a. Familiarize site personnel with PAMRI deployment strategy.

b. Establish interfaces for future activities.

c. Assess status of site preparation activities.

d. Obtain site/regional input to site activation plan.

e. Provide regions with technical data so engineering can start.

41.4 **Start PAMRI Site Preparation.** This is an adjustable date. Site preparation must be completed or substantially completed before the Site Readiness Review.

41.5 **Site Activation Plan (SAP) AT01.** The AAS prime contractor is required to deliver the SAP 9 months before equipment delivery for each site. The SAP is a comprehensive plan that tells how the AAS contractor plans to install, checkout, test, turn over the equipment and support the FAA through commissioning of the equipment. For a detailed discussion of the SAP see paragraph 58.4.

41.6 **Finish PAMRI Site Preparation.** See paragraph 41.4.

41.7 **Site Readiness Review (SRR).** The SRR is to be conducted after completion or substantial completion of site preparation. It is to be completed in sufficient time for the contractor to prepare the Site Readiness Review Report (SRRR).

41.8 **Site Readiness Review Report AT03.** The SRRR, AT03, documents the findings of the SRR. It describes new or remaining site deficiencies that need correction before delivery of the equipment. The report is required no later than (NLT) 3 months prior to equipment delivery. See paragraph 58.5 for more detail.

41.9 **PAMRI Delivery.** The earliest delivery date of equipment to each site is established within the ESN and the AAS contract. The schedule and waterfall shown in the figure reflect the established equipment delivery dates relative to contract award.

41.10 **PAMRI Acceptance.** Contractor acceptance inspection (CAI) is the acceptance indicated in this paragraph. The waterfall for this event is derived from the ESN and the AAS contract. This is when the FAA takes control of the equipment and the FAA integration testing begins. Refer to paragraphs 83.2.6.

41.11 **PAMRI Operational Readiness Demonstration (ORD).** The ORD milestone is specified in the ESN and the AAS contract. This activity is the formal demonstration that precedes the Joint Acceptance Inspection (JAI) report which marks the commissioning of the equipment. Refer to paragraph 83.2.10.

41.12 **Equipment Removal.** Equipment removal milestones occur at about 90 days after PAMRI equipment is commissioned. These milestones are tentatively set and are really determined by the concurrences of region, site, and headquarters personnel that comprise the joint acceptance inspection board. Refer to paragraph 83.2.11.

42. INTERDEPENDENCIES AND SEQUENCE.

42.1 **Flight Data Entry Processor (FDEP).** The Adapter Unit (AU) replacements for the PAM's do not provide FDEP adapters. The FDIO program along with the Host software modification replaces the FDEP adapters with GPO/GPI adapters. The FDIO program is scheduled for completion prior to PAMRI delivery.

42.2 **Teletype (TTY) Adapters.** The AU replacement for the PAM's do not provide TTY adapters. The

design was based on NADIN IA replacing low-speed circuits with medium-speed circuits. NADIN IA was commissioned in 1988 with the exception of service A to the ARTCC's. This issue is being addressed at the headquarters level.

43.-49 **RESERVED**.

CHAPTER 5. PROJECT MANAGEMENT

50. PROJECT MANAGEMENT, GENERAL. The successful implementation of this project requires elaborate coordination procedures and activities involving a number of headquarters, regional, and field organizations. Implementation activities also involve the ACT, AAC, the AAS prime contractor, the SEI contractor, and various support contractors. The following subparagraphs provide a comprehensive listing of the organizations involved in the implementation by the area of responsibility within the PAMRI project. The Advanced Automation System Participants Document (AASPD) provides a comprehensive listing of project management personnel and their respective areas of responsibility within the project. Air Traffic (AT) and Airway Facilities (AF) ARTCC managers receive copies of the AASPD.

50.1 Overall Management. The following matrix, figure 50-1, describes the organizations with primary responsibility for the PAMRI implementation and the management tasks for which each organization is responsible.

Management Area	AAP200	IBM	ACN100	AAC400	AHT-1	ATR150	ASM220	AAC9000
System Implementation	X	X						
Facilities	X							
Test & Evaluations	X	X	X			X		
Logistics	X	X		X			X	
Training	X				X			X

Overall Management Matrix
Fig. 50-1

51. PROJECT CONTACTS. Project contacts are described throughout this order and within the AASPD. Project contacts described herein are listed by organization only. The participants document lists name, title, Government and commercial phone number, and the complete organizational mailing address.

51.1 Regional Representatives. Regional representatives have been designated for the PAMRI project. The list of regional representatives to assist the implementation effort is contained in the AASPD

.

51.2 ARTCC AAS Onsite Coordinators. Onsite coordinators are listed in the AASPD. An AT and an AF coordinator are listed for each ARTCC.

51.3 ACT Personnel. Appropriate organizations at the ACT have members on various teams supporting AAS implementation. The members are listed in the AASPD. Field personnel supporting testing at the ACT are provided points of contact prior to reporting to the ACT.

51.4 AAC Personnel. Appropriate organizations at the Aeronautical Center have members on the various teams supporting AAS implementation. The members are listed in the AASPD.

51.5 FAA Headquarters Personnel. Project contacts are listed in the AASPD.

52. PROJECT COORDINATION.
Figure 52-1 lists the organizational elements requiring coordination and a summary of the requirements for PAMRI implementation.

53. PROJECT RESPONSIBILITY MATRIX. Figure 53-1 shows the organizations with primary responsibilities for each major PAMRI implementation task. Figure 53-1 provides the paragraph number and title in the PIP for each task.

54. PROJECT MANAGERIAL COMMUNICATIONS. This paragraph provides a listing of the regularly scheduled project meetings and conferences, including date, time, and place of each meeting or conference when known. This paragraph also lists recurring upper level project reports, their contents, and other communications such as newsletters and bulletin boards.

54.1 Meetings. The following subparagraphs define the meetings and conferences for the PAMRI project.

54.1.1 Contractor Sponsored.

a. Critical Design Review (CDR) was conducted in June 1988.

b. System Design Briefing was held February 1989.

c. Training conference was held December 1988.

Organi-zation	Organization Name	Coordination Requirements
AAC-400	FAA Depot	Logistics Support
AAC-900	FAA Academy	Training Conduct and Review
AAP-250	COTR Branch	Testing at Factory and ACT
AAP-200	AAS Division	Engineering/Contract
AAP-240	Implementation Branch	Implementation and OT&E
AAP-230	Software Branch	Development of GFP Software
AAT-14	AT Training Req. & Cert. Branch	Air Traffic Training Requirements
ACN-130	Advanced Automation System Branch	Testing and Evaluation, ACT
ASE-600	Configuration Management AND Engineering Support Div.	Control of Configuration Management
ANS-100	Transition Assessment Division	Integration with other NAS Plan Projects
ALG-340	Contract Management	Contract Issues
ANS-220	Air Route Traffic Control Center Program	New buildings, building modifications, space
ANS-230	Facility Power Systems Program	Facility Power Allocations
ASM-400	NAS Automation Field Support Division	ACT Shakedown Testing and Field Technical Support
ASM-120	Technical Standards Branch	CDRL Review
ASM-260	Operations Program Branch	AF Staffing Requirements
ASM-240	Future Program Branch	Maintenance Concept & Planning
ATR-140	ACF Implementation Branch	Air Control Facilities
ATR-150	Requirements Branch	Operational Requirements
ATR-200	Automation Software Division	Operational Software
AHT-1	Training and Higher Education	Training Development and Implementation

Project Coordination Matrix
Fig. 52-1

54.1.2 FAA Sponsored.

54.1.2.1 AF Transition Requirements Verification Team. The Implementation Branch, AAP-240, has the primary responsibility for organizing the activities of the Airway Facilities Transition Requirements Verification Team (AFTRVT).[1] The team members and responsibilities are contained in the AASPD.

54.1.2.2 National Airspace Integrated Logistics Support Management Team (NAILSMT). The National Airspace Integrated Logistics Support (NAILS) Master Plan calls for the formation of a NAILS management team (NAILSMT) to assist the program manager in planning, monitoring, and controlling a project contractor's NAILS activities.[2] NAILSMT is responsible for:

a. Assisting in the negotiations pertaining to NAILS activities.

b. Conducting formal and informal incremental reviews of the contractor's NAILS Program.

c. Evaluating LSA data.

d. Providing direction by way of the Contract Officers Technical Representative (COTR) to the contractor on matters pertaining to logistics support.

e. Resolving supportability issues and concerns.

f. Assessing the NAILS Program.

g. Providing formal comments based on assessments of program and design reviews.

h. Establishing an effective working interface with the contractor in order to achieve NAILS goals.

54.1.2.3 Logistics Guidance Conference. A logistics guidance conference was held one month after contract award. Specific guidance was given by the FAA on Logistics Support Analysis Records (LSAR) data elements required, data codes to be used, and rules for data submission. Schedules for data submission were also agreed upon for PAMRI documentation.

54.1.2.4 LSA Guidance Conference. An LSA Guidance Conference was held one month after contract award for the full AAS to provide the contractor with guidance and to review preliminary material to accomplish the LSA data requirements. The LSA guidance conference and the Logistics conference were held simultaneously.

54.1.2.5 Provisioning Conference. A provisioning conference is conducted at the contractors plant or at the original manufacturers plant for the PAMRI

Paragraph #	Paragraph Title	AHT	AAP100	AAP2400	AAP2000	ASE1000	ASM	ATR	Region	Site
54	Managerial Communications			X						
55	Implementation Staffing			X						
56.4.1	Project Implementation Plan			X						
56.4.2	Master Test Plan					X		X		
56.4.3	OT&E Management Plan			X						
56.4.4	Test Requirements OT&E					X		X		
56.4.5	Int Logistics Support Plan			X						
56.4.6	NAS Transition Plan							X		
56.4.7	Regional Transition Plan								X	
56.4.8	Facility Transition Plan								X	X
57	Applicable Documents			X						
58	Contractor Documentation			X						
60	General Funding Status		X							
70	General Deployment Aspects			X						
71	Site Preparation			X						
72	Delivery				X					
73	Installation			X						
81	Factory Verification				X					
82	ACT Verification				X					
82.1.5	FAA Verification				X					
83.2.1	Installation and Checkout			X						
83.2.2	Hardware Integr. & Testing			X						
83.2.6	CAI			X						
83.2.7	FAA Integration Testing									
83.2.8	Certification						X			
83.2.9	IOC								X	X
83.2.10	Shakedown and Changeover							X	X	X
83.2.11.3	Equipment Removal			X					X	X
83.2.12	Joint Acceptance Inspection								X	X
91	Training	X		X				X	X	X

Primary Responsibility Matrix
Fig. 53-1

equipment. Members of NAILSMT may also be called on to assist in the provisioning effort. The provisioning team is established by the FAA Depot Provisioner prior to the provisioning conference. One long leadtime items conference may be held separately from other provisioning conferences.

54.1.2.6 LSA Conference. As a result of the LSA Guidance Conference, LSA meetings are held with the contractor on a continuing basis or as needed to discuss and define issues such as maintenance, support, provisioning, contractor contacts, ability and/or need to assume contractor responsibilities, etc.

54.1.2.7 Regional Coordinators. Regional coordinators meet with Washington headquarters personnel on a regular schedule. It is anticipated that meetings be held at least semiannually and prior to each significant event. Regional coordinators perform the major interface activities between the Washington headquarters and SEI contractor planning groups and the facility implementation groups and the regional Facilities and Equipment (F&E) complement.

54.1.2.8 En Route Personnel. En route personnel designated by the individual ARTCC's and regions perform the major onsite coordination activities. Meetings are held with en route site personnel prior to each major facility activity. Meetings are generally held at a central location when more than one site is involved, or at the facility when the subject matter is site specific.

54.1.2.9 ACT. Headquarters and SEI contractor personnel meet on an ad hoc basis to complete Operational Test and Evaluation (OT&E) planning and to fully coordinate ACT and field testing activities and responsibilities.

54.1.2.10 AAC. AAC-4 NAS Program Managers are responsible for coordination of all FAA Academy and FAA Depot participation in the AAS Program.

54.1.2.10.1 FAA Academy. FAA Academy meetings take place to fully coordinate centralized training activities, such as training material reviews and other Contract Data Requirements List (CDRL) reviews and facility implementation activities. It is expected that these activities begin to accelerate just prior to the first PAMRI training conference. Meetings occur as needed, but generally in line with contractor deliveries.

54.1.2.10.2 FAA Depot. FAA Depot meetings take place to fully coordinate and plan required activities such as CDRL reviews, provisioning conference planning, and facility implementation activities. Meetings occur as needed, but generally in line with coordinating and planning prior to NAILSMT meetings with the contractor.

54.2 Communications Media.

54.2.1 Computer Net. AAP-240 has the primary responsibility for establishing and maintaining the AAS project computer net.

54.2.2 FAA Mail. It is expected that a nationwide E-Mail system will be implemented early in the AAS implementation schedule. This system may be used by interested and involved parties located at FAA headquarters, all field sites, AAC, and ACT.

55. IMPLEMENTATION STAFFING. This paragraph details the personnel requirements that are peculiar to the implementation phases of the PAMRI. Post commissioning operational maintenance personnel are not considered here.

55.1 Implementation Teams. A team of ARTCC personnel should be established under the technical direction of the onsite coordinators to provide technical expertise at the facility and to observe the onsite testing and verification activities. The implementation team should consist of:

a. Hardware specialist (AF).

b. Diagnostics software specialist (AF).

c. NAS support software specialist (AT) or Software Support Group (SSG).

d. NAS operational software specialist (AT or SSG).

e. En route controllers. (Monitor displays to ensure no degradation.)

f. Resident SEI contractor.

55.1.1 Team Training. It is highly desirable that team members have en route AF and AT experience at their particular site, and that team members be included in the earliest training allocation for their PAMRI. Members of the PAMRI implementation team should participate in the ACT activities which include site simulation testing, test and evaluation (T&E), and building of the site-adapted software. Assignment of the personnel to support these activities are coordinated between the onsite coordinator, sector manager, and air traffic manager. If possible, members visit prior sites with similar equipment and participate in PAMRI implementation to obtain implementation experience for their facility.

55.1.2 Team Responsibilities. The responsibilities of the team evolve through the PAMRI implementation process. Initially, the team assists the onsite coordinator in planning for site preparation and deployment. Later, it monitors the contractor throughout installation, checkout, integration, and testing activities. Finally, the team supports FAA integration, testing, operational shakedown, and equipment removal activities.

55.2 Labor Relations. The AAS Program fully coordinates the implementation activities with Air Traffic and Airway Facilities labor relations organizations.

55.3 AF and AT AAS/Voice Swiching and Control System (VSCS) OnSite Coordinators. An FY 91 budget request has been submitted for each ARTCC to fund two (2) AAS/VSCS project onsite coordinator positions, one AF and one AT. In the interim, AAP has requested and received the names of AF and AT onsite coordinators who are the focal points for the AAS/VSCS activities until the permanent positions are filled. See figure 55-1 for onsite coordinator tasks.

56. POLICIES, PLANS, AND REPORTS. This paragraph describes the plans, policies, and reports referenced by this PIP.

56.1 Policies. The scope, content, and requirements for the described plans are established by the following policy documents.

56.1.1 NAS Design Documents. NAS System Requirements Specification (NASSRS), and the NAS System Specification (Allocated Design) documents provide the NAS system performance and interface requirements for the 1995 NAS configuration.

56.1.2 NAS Transition Phase System Description Document. The NAS Transition Phase System Description Document has been prepared to provide a standard approach to planning, status compilation, and the control of all efforts involved in the transition of facilities and equipment (hardware and software) through the year 2000.

56.1.3 NAS Integrated Logistics Support Policy. The NAS Integrated Logistics Support Policy establishes the FAA National Airspace Integrated Logistics Support (NAILS) Master Plan for the NAS projects.

56.1.4 FAA Test Policy Order. Order 1810.4A, Test and Evaluation Program, identifies responsibilities for test and evaluation of all NAS acquisitions and modifications. The order also directs compliance with NAS MD-110, T&E Terms and Definitions, and

TASK	Joint	AF
Review contractual requirements for PAMRI	x	
Submit requests for overtime and travel funds to support implementation, coordination, planning, orientation, testing, and integration activities	x	
Monitor PAMRI Training Programs	x	
Coordinate AAS contractor site surveys		x
Ensure that Govt. furnished property and NAS software is handled according to the contract	x	
Coordinate delivery of PAMRI hardware		x
Coordinate the site review of the AAS contractors site activation plan	x	
Monitor the AAS contractors installation and tests		x
Ensure the FAA test personnel are assigned for all contractor and FAA testing	x	
Coordinate and monitor the AAS contractors activities during the PAMRI integration testing		x
Ensure that the operational software used for site acceptance testing incorporates site adaptation	x	
Coordinate and monitor systems acceptance testing	x	
Ensure that baseline test scenarios and analysis procedures are prepared and available	x	
Ensure that all tests required for the system validation are documented	x	
Ensure issue of test directives	x	
Distribute copies of the PAMRI test reports	x	
Ensure NAS software meets operational req.	x	
Ensure that system certification procedures are validated	x	
Coordinate AAS and SEI contractor support activities	x	
Coordinate FAA integration testing activities	x	
Coordinate system shakedown activities	x	
Ensure that the following reports are prepared: - IOC - Status - ORD	x	
Coordinate the power switchover to the critical power bus	x	
Coordinate non-AAS support activities and support system installations for PAMRI	x	
Coordinate and monitor site refurbishment		x
Ensure that the obsoleted equipment is removed and disposed with in accordance with the ALG instructions		x
Participate in the decision to disconnect the transition switches	x	
Ensure that program information is communicated to all national, regional, and facility contact points	x	

AAS Onsite Coordinator Participation
Fig. 55-1

FAA-STD-024, Preparation of T&E Plans and Procedures.

56.2 Plans. A number of different plans affect the directions of the site implementation which range from high level NAS Plans, to generic or site specific program plans produced by individual regions. Figure 56-1 depicts the hierarchy of these plans.

56.3 NAS Documentation. NAS documentation which is available to support the local site developed implementation plan is as follows:

56.3.1 National Airspace System Plan. The NAS Plan is the top level document that identifies the planned evolution of the NAS and the associated major Research and Development (R&D) and F&E programs to accomplish it. Strategies and briefs as to program goals are also identified.

56.3.2 Interface Management Plan. The Interface Management Plan defines the production of the Interface Requirements Documents (IRD) and Interface Control Documents (ICD) and assigns responsibility for their accuracy. The plan is issued to assure agreement between the IRD's and the NAS system design and identifies the status with regard to the baseline of each document.

56.3.3 Master Schedule System Implementation Plan. The Master Schedule System (MSS) describes the technique for preparing and coordinating time referenced requirements for project support of the NAS Plan. The MSS describes the time related dependency between projects; defines the time requirements for integrating projects into site operations; defines the time requirements for NAS Plan identification of actions required to fulfill program goals; and provides networks and bar-chart schedules with a time reference for performance evaluations.

56.3.4 NAILS Master Plan. The NAILS Master Plan identifies NAILS requirements and provides guidance for implementing project NAILS programs into the overall NAS structure.

56.3.5 NAS Training Plan. The NAS Training Plan provides the general requirements and guidelines for training personnel on equipment being installed to upgrade the NAS.

56.3.6 ACT Operations Management Plan. The ACT Operations Management Plan defines the methods and

FUNCTION	SYSTEM/ORGANIZATION LEVEL		
	NATIONAL AIRSPACE SYSTEM	PAMRI PROJECT	AF/AT FACILITIES
Program Management	NAS Plan Master Schedule System Implementation Plan Program Master Schedule Baseline Interface Management Plan	Project Implementation Plan	
Integrated Logistics Support	NAILS Master Plan	Integrated Logistics Support Plan	
Training	NAS Training Plan	PAMRI Training Plan	
Verification	NAS Verification Plan NAS Verification and Implementation Handbook	Master Test Plan OT&E Management Plan	
Transition	NAS Transition Plan	Transition Requirements Outline Project Implementation Plan PAMRI Transition Plan	Regional Transition Plan Facility Transition Plan Site Implementation Plan

Plan Hierarchy
Fig. 56-1

procedures used to process NAS projects through the ACT. By inclusion or reference, the plan provides the ACT management operations, technical transition planning, and facility modification and checkout required to accommodate new projects. The plan also provides for the preparation, review, and approval of test plans and procedures, including test operations and the scheduling and status information of the FAA Technical Center verification activity.

56.3.7 **NAS Verification Plan**. The NAS Verification Plan and companion NAS Verification and Implementation Handbook (NVIH) are joint implementing documents of Order 1810.4A. The Verification Plan provides an overall scheme for verification of NAS projects and designates organizations responsible for the various verification activities in compliance with this policy order.

56.3.8 **NAS Verification and Implementation Handbook (NVIH)**. The NVIH is a "how to" guide that defines verification standards, processes, and methods used in performing integration, installation, and test of projects (subsystems) required to upgrade the NAS.

56.4 **Projects Specific Plans**.

56.4.1 **Project Implementation Plan**. The PAMRI PIP is prepared and maintained by the Implementation Branch, AAP-240. The task of the PIP includes:[3]

a. Providing an overall project description.

b. Describing the project schedules and status.

c. Describing the project management and responsibilities.

d. Describing project funding.

e. Describing the steps for deployment.

f. Describing the project's verification, testing, and evaluation.

g. Describing the implementation aspect of integrated logistics support.

56.4.2 **Master Test Plan**. The Automation System Engineering Division, ASE-100, has the primary responsibility for the Test Management Plan (TMP). The TMP is a broad plan which relates test objectives

to required system characteristics and critical issues.[4] The task of the TMP includes:

a. Integrating objectives, responsibilities, resources, and schedules for testing and evaluation.[5]

b. Showing the rationale for the kind, amount, and schedules of planned testing.[6]

c. Relating the test and evaluation to technical risks, operational issues and concepts, system performance, reliability, availability, maintainability, and logistics requirements.[7]

d. Explaining the relationship of the simulations, subsystem tests, integrated system development tests, and initial operational tests to decisions to proceed to the next acquisition phase or into fully operational service.[8]

e. Addressing the testing and evaluation to be accomplished in each program phase.[9]

f. Integrating the Verification Requirements Traceability Matrix (VRTM)[10] for contractor conducted testing with the VRTM for FAA conducted testing.[11]

56.4.3 AAS Operational Test and Evaluation (OT&E) Program Plan. The Implementation Branch, AAP-240, has developed an overall AAS OT&E Management Plan addressing each segment of the AAS implementation. This plan further defines procedures to be followed and responsibilities of different organizations during each phase of each segment of the OT&E process. Approaches to schedules for activities which lead to and include FAA conducted OT&E from ACT acceptance to site shakedown testing are described. A product of the OT&E activities is the development of test procedures used in the execution of site shakedown. The scope of the task of the AAS Operational Test and Evaluation Program Plan includes the following:[12]

a. Clarifying the inter-service and inter-divisional relationships.

b. Establishing mechanisms to assure user participation in the OT&E planning and execution.

c. Clarifying mechanisms for assigning and committing resources to OT&E tasks.

d. Establishing accountability for executing the tasks associated with implementing the plan.[13]

56.4.4 Test Requirements: Operational Test and Evaluation (OT&E) of the Advanced Automation System. The Automation System Engineering Division, ASE-100, has the primary responsibility for the AAS OT&E Test Requirements.

56.4.5 Integrated Logistics Support Plan. The Implementation Branch, AAP-240, has the primary responsibility for the Integrated Logistics Support Plan. The task of producing the Advanced Automation System Integrated Logistics Support Plan includes the following:

a. Describing the organizational structures and responsibilities for the planning and execution of the AAS logistics support program.[14]

b. Coordinating with the AAS prime contractors to ensure that logistics factors are considered during the system design process.[15]

c. Coordinating the supply support structure.[16]

d. Describing the support and test equipment.[17]

e. Describing the AAS training program.[18]

f. Describing the AAS direct work staffing requirement.[19]

g. Describing the ACCC maintenance support facilities.[20]

h. Describing the packaging, handling, storage, and transportation requirements for AAS equipment.[21]

i. Describing the AAS documentation support.[22]

j. Defining the Integrated Logistics Support terms for AAS.[23]

k. Providing the AAS maintenance concept.[24]

56.4.6 NAS Transition Plan.[25] The National Airspace System Transition Plan (NTP).

a. Presents the overall strategy for transition of the NAS and its facilities, equipment, and personnel from the present to the end state configuration.

b. Establishes the roles and responsibilities of the organizations involved in the transition process.

56.4.7 Regional Transition Plan. Each of the nine regions develops a transition plan showing how that region plans to transition to each of the projects at each of its ARTCC's. This plan includes the following:

a. System integration planning.

b. Project planning.

c. Regional training.

d. Logistics transitioning.

e. Facility engineering.

f. Operational planning.

g. Non-FAA equipment interfaces.

h. Human resource planning.

i. Transition problem solving.

56.4.8 Facility Transition Plan. ARTCC personnel will develop the Facility Transition Plan. This document addresses:

a. Operations planning.

b. Procedures reviewing.

c. Non-FAA equipment interfaces.

d. Human resource planning.

e. Transition implementation planning.

f. Transition problem solving.

56.4.9 Site Implementation Plan (SIP). A SIP is prepared by ARTCC personnel with the support of the AAS/VSCS AT/AF coordinators. The SIP at the first site is prepared with participation of the First Sites Group and adapted by follow-on sites. This SIP includes:

a. Purpose and scope.

b. Project description.

c. Project schedule.

d. Facility project integration.

e. Management and responsibilities.

f. Human resource planning.

g. Funding process.

h. Implementation activities.

i. Verification activities.

j. Maintenance.

56.4.10 Human Resource (HR) Planning. Human Resource Development (AHD) has provided guidelines for data to be included in the HR planning section of the SIP. HR planning will be critical to the success of project implementation. The purpose of HR planning is to ensure well in advance of system deployment, that there are sufficient numbers of qualified, trained personnel to staff facilities and to work positions created or affected by addition of new equipment. In accordance with AHD guidelines, the following areas should be addressed:

a. Implementation Staffing.

(1) Numbers of AT and AF personnel by specialization required to field, maintain, and operate the system.

(2) An analysis of the projected availability of qualified personnel to field, maintain, and operate the system.

(3) Identification of project personnel shortfall and facility plans for recruitment/staffing.

b. Communications /Workforce Acceptance. Description of facility plans to provide employees with information about the new system and its impact on employees prior to training and installation/implementation. Attention should be focused on special human resource transition problems or requirements associated with deployment to include, where appropriate:

(1) Changes to procedures and new procedures related to the new system.

(2) Training planning.

(3) Labor relations.

c. Training.

(1) Identification of all FAA Academy, site, or contractor-provided courses and training provided in support of this project by AT/AF specialization.

(2) A description of training plans to support this project to include projected class schedules and support requirements (equipment, facilities, materials).

(3) The AT/AF AAS/VSCS coordinators must ensure that the human resources requirements are included in the SIP.

56.5 Reports. Reports directly associated with implementation are described in the following paragraphs:

56.5.1 Management Reports. Implementation activities are documented by the reports described in this paragraph. The purpose of these reports is to provide information for contract monitoring purposes and to document problems that occur during the implementation effort. The reports may include data from the reports required of AT and AF for day-to-day operational activities. These reports are prepared under the authority of the onsite coordinator and distributed to the regional Advanced Automation Program (AAP) representative and AAP-240.

56.5.2 Status Reports. The onsite coordinator is responsible for the preparation of Periodic Status Reports from the equipment deliveries to each respective ORD. Follow-on reports are required regarding equipment removal and follow-on rehabilitation. The reports are in narrative form and prepared weekly (or more frequently if circumstances warrant) to report activities conducted during the week and the outcomes of these activities. The Periodic Status Reports summarize the week's test results, exception reports, implementation procedures, problems, implementation milestones, and solutions. Those reports are used to expedite future AAS implementation efforts.

56.5.3 Problem Reports. The onsite coordinator must maintain a list of open items (problems that require resolution) throughout the implementation efforts. Problems should be categorized as major (to be closed prior to IOC) or minor with an appropriate suspense date. These problems should be entered into the information data base in ACT Central Support Facility and included in the periodic status reports that are submitted to AAP-240. When a specific problem is resolved, the associated open item can be closed. The ARTCC maintains a log of all related failures with the time that the failure occurred and the time that the equipment was returned to an operational state. This information must be included in all problem and status reports so the Advanced Automation Program Office (AAPO) can determine the contractor's compliance with the system Reliability, Maintainability, and Availability (RMA) requirements of the AAS contract.

56.5.4 Initial Operating Capability (IOC) Reports. The onsite coordinator sends an IOC report upon declaration of IOC. The IOC report should be in narrative format and is notification of IOC in accordance with Order 6030.45A, Facility Reference Data File.

56.5.5 Final IOC Reports. The onsite coordinator is responsible for the preparation of the final written report which is sent within 10 days after IOC. It summarizes all test activity between Operational Site Acceptance and IOC, including hardware, software, personnel, training, and support problems encountered during the period and the resolution of these problems.

56.5.6 Operational Readiness Demonstration (ORD) Reports. The onsite coordinator sends an ORD report upon completion of the ORD. The ORD report is in

narrative format and is notification of ORD in accordance with Order 6030.45A.

56.5.7 **Final ORD Report**. The onsite coordinator is responsible for the preparation of a final written report which is sent within 10 working days after ORD. It summarizes all test activity between IOC and ORD, including hardware, software, personnel, training, and support problems encountered during the period and the resolutions.

56.5.8 **National Airspace Performance Reporting System (NAPRS)**. In the event of trouble or failure within the system (i.e., system interactions or contaminated data bases) which degrade air traffic control, the primary concern is continuing safe and efficient air traffic control. The test operators at the facility must ensure that actions are first taken to restore and/or continue air traffic control services and then report the problem to the test director who ensures that the problem is reported through the normal channels utilizing the NAPRS.

56.5.9 **Deployment Reports**. Deployment reports are prepared by the AAS contractor. They are submitted as part of the SAP and the SRRR. Shipping reports and incident reports are also included.

56.5.10 **Site Survey Reports**. Site survey reports are provided to document the data essential for site preparation, including identification of any special problems or considerations, the summarization of pertinent technical data, and the coordination and assignment of critical action items.

56.6 **Test Readiness and Test Result Reports**. Reports are prepared for all tests that are conducted. These reports are completed for both before and after the subject test. The following subparagraphs discuss these reports.

56.6.1 **Test Reports**. Testing activities are documented by the reports described in this section. The purpose of these reports is to provide information and data for contract monitoring and system evaluation.

56.6.1.1 **Contractor Interim Reports**. A test report is prepared by the contractor to document the results of each test and to identify and evaluate discrepancies between expected and actual test results. The test reports are maintained onsite and available for examination by the FAA. This includes all hard copy outputs, observer/operator logs, data reduction lists, and program listings.

56.6.1.2 **FAA Interim Reports**. A test report is prepared by the test manager for each test. It contains all records and observations made during the test. The report is filed locally, but is available to headquarters, regional, ACT, or contractor personnel if required.

57. **APPLICABLE DOCUMENTS**. The list of applicable documents is provided in appendix 2. AAP-200 maintains a complete file of all documents applicable to the AAS procurement.

58. **CONTRACTOR DOCUMENTATION**. The AAS contractor provides four documents in support of the implementation:

a. Site Preparation Design Information Package (SPDIP) CDRL item number AT02, Data Item Description (DID) number UDI-AAP-092. One SPDIP for ARTCC's, one for Air Traffic Control Towers (ATCT).

b. Transition Plan (TP) CDRL item number AT05, DID number UDI-AAP-134.

c. Site Activation Plan (SAP) CDRL item number AT01, DID number UDI-AAP-055.

d. Site Readiness Review Report (SRRR) CDRL item number AT03, DID number UDI-AAP-093.

58.1 **Site Preparation Design Information Package**. The SPDIP (CDRL item number AT02, DID number UDI-AAP-092), identifies to the Government and designated facility design and construction agencies, specific technical requirements upon which the AAS facilities design is predicated. A separate volume SPDIP is delivered for en route and Terminal Control Computer Complex (TCCC) AAS system segments. The SPDIP is a generic design.

58.1.1 **Schedule**. The SPDIP is due to the Program Office not later than 5 months after contract award. The Government has 120 days for review and comments. The contractor has 120 days to update the SPDIP with the comments.

58.1.2 **SPDIP Contents**. The DID divides the SPDIP into seven sections. These sections are listed as follows. Refer to the DID for specific details.

a. Civil.

b. Architectural.

c. Structural.

d. Mechanical.

e. Electrical.

f. Hazards.

g. Legal Compliance.

58.2 Site-Specific Design Package. The site-specific design package contains all the information identified from the SPDIP as adapted to each specific site. These documents are created by the SEI contractor, R.M. Parsons, for each ARTCC under sponsorship of ANS-220. They are used by the regions for contract award for site preparation. ANS-220 has the primary responsibility for producing the packages. AAP-240 has the primary responsibility for assuring that the regions and sites obtain the packages for review and use. The regions have the primary responsibility for implementing the design through construction contracts.

58.3 Transition Plan (TP). The TP (CDRL item number AT05, DID number UDI-AAP-134) describes the contractor's methodology for transitioning from the current system to the PAMRI. The TP includes a description of work efforts, test efforts, and hardware and software requirements for accomplishing each phase of the transition and for verifying its successful completion. The TP also contains the following:

a. The method to accomplish each transition, on a step-by-step basis.

b. Identification of hardware and software capabilities required to install and test the AAS in the ATC facilities.

c. Plans and procedures for switching ATC operation between the new system configuration and the current system configuration, including fallback procedures to the previous configuration, as required for uninterrupted system operations.

d. Identification of changes to and impacts on ATC operations during the transitions.

e. Identification of changes to and impacts on ATC operations and maintenance procedures during the transitions.

f. Identification of personnel training coordination requirements (AT and AF) during the transitions.

g. Identification of the system configuration that exists during each phase of the transition.

h. Identification of changes to and impacts on physical facilities caused by the transition.

i. Identification of personnel resources required to support the transitions.

j. Identification of changes to and impacts on support systems during the transitions.

k. Detailed schedules to support the transitions.

l. Identification of risks associated with the transitions and ways to mitigate risks.

m. Plans and procedures to assure the timely development of a software package that is compatible with the current NAS ATC software.

n. Identification of transition issues that either address transitions of responsibilities from the contractor to the FAA or actions that must occur at the national level to support site transitions.

o. Identification of testing and verification coordination requirements during the transitions.

58.4 Site Activation Plan (SAP). The contractor's SAP (CDRL UDI-AAP-055, item number AT01) defines the specific steps to be taken during the installation. The contractor provides a SAP for each site for each AAS system segment. Each PAMRI SAP provides for each PAMRI a site specific narrative and graphic description of the installation, integration, and test of the operational parts, components, subsystems, systems, and support equipments of the PAMRI. The SAP includes a material requirements list.

58.4.1 **Schedule**. The SAP is scheduled for delivery to the program office NLT 9 months prior to equipment delivery for Government review and comments. The Government has 45 days for its review cycle. A site-specific SAP is scheduled to arrive at each site 7 months prior to equipment delivery to that site.

58.4.2 **Contents**. The plan contains, on a site-specific basis, the detailed narrative, graphic, and material requirements necessary to receive, install, checkout, test, and integrate the operational parts, components, subsystems, systems, and support equipments for each segment and each site listed in the contract. The plan identifies required Government equipment and resources not listed in the "Government Furnished Property." The SAP contains the information identified in the following subparagraphs.

58.4.2.1 **General**. The SAP includes the following types of site-specific, general information:

a. The purpose and scope of the plan, including site destinations.

b. A list of applicable documents, drawings, manuals, plans, and procedures required for the installation, checkout, test, and integration conduct.

c. Schedules and schedule considerations for each function.

d. Summary of records and reports the contractor submits to the Government during site activation.

e. Contractor personnel security requirements and procedures.

f. Instructions on the use of the following types of materials associated with the equipment being installed but not provided with this SAP:

(1) Manuals.

(2) Procedures.

(3) Drawings.

(4) Specifications.

g. Identification of contractor personnel and equipment resources required during receiving, installation, integration, initial checkout, and formal testing.

h. Identification of tasks the contractor expects the Government to perform, and the Government personnel and equipment resources required from the Government during site activation.

58.4.2.2 **Pre-Deployment**. The plan includes the following site-specific pre-deployment information:

a. Descriptions of environmental or physical deficiencies found at the site which may cause difficulty in executing requirements of the contract, including recommended solutions.

b. Electrical power requirements for the site, including input/output voltages and frequency, grounding, power (in KVA), and wiring terminations.

c. Lighting requirements.

d. Cooling requirements, including both facility and equipment requirements for air conditioning, chilled water, and any other special cooling requirements.

e. Special site information and constraints, including the following:

(1) Access requirements.

(2) Special clear-space requirements.

(3) Required relationships between existing system elements.

(4) Clearance and turning requirements.

(5) Line-of-sight requirements between equipment.

(6) Floor loading weight.

(7) EMI restrictions.

58.4.2.3 **Deployment**. The plan includes the following site-specific deployment information:

a. A complete listing of all deliverables at the site. Lists include hardware, software, and support materials.

b. A complete list of all special tools and equipment needed to support the delivery at the site, including notations to indicate which items are contractor-furnished and which items are Government-furnished.

c. Unpacking, handling, and inventory instruction, including contractor's plan for disposing of packing and other waste material.

d. Inventory reporting procedures.

e. Shipping and delivery data (e.g., number of trucks per day, truck identification, bill of lading for each truck contents, and estimated time of arrival).

f. Deployment issues and contingency plans.

58.4.2.4 **Installation and Checkout**. The SAP includes the following site specific, installation, and checkout details:

a. A description of AAS contractor's construction and building modifications required during the installation of this SAP's segment.

b. Contractor's plan for providing raised floor cutouts.

c. Equipment emplacement routes.

d. Equipment emplacement procedures. (Note: Include layouts and drawings which show equipment and material locations and configurations of items to be installed.)

e. Inspection procedures.

f. Procedures for the emplacement of spares, support materials, and major assemblies.

g. Procedures for the installation of signal cables, power cables, assemblies and ground straps. Include cable and wiring diagrams and cable length data.

h. Checkout procedures for initial units and post assembly units.

i. Procedures for the verification of contractor installed signal and power cables to Government Furnished Equipment (GFE).

58.4.2.5 **Integration and Test**. The SAP includes the following site-specific, integration and details:

a. Procedures for the verification of the connection of contractor installed signal and power cables to Government-furnished sources.

b. Procedures for the verification of the installation of interfaces between contractor provided equipment.

c. Hardware and software integration procedures that define:

(1) The sequence of events.

(2) The time requirements for each event.

(3) Coordination and planning with ongoing site activities.

(4) Contingency plans to be used in the event of difficulty.

d. Dry run system acceptance test procedures that verify that all contractor-installed hardware and software is ready for acceptance testing.

e. Any site unique hardware or software considerations.

f. System acceptance test procedures for the Government's acceptance of the contractor supplied equipment. These procedures define:

(1) The sequence of events.

(2) The time requirements for each event.

(3) Coordination and planning with ongoing site activities.

(4) Contingency plans to be used in the event of difficulty.

58.4.2.6 **IOC Activities**. The SAP includes the following site-specific procedures:

a. Site adaptation procedures.

b. NAS system integration and test procedures that define:

(1) The sequence of events.

(2) The time requirements for each event.

(3) Coordination and planning with ongoing site activities.

(4) Contingency plans to be used in the event of difficulty.

58.4.2.7 **Contractor Services**. The SAP includes descriptions of the contractor's participation in the FAA's shakedown activities that follow IOC and precede ORD.

58.5 **Site Readiness Review Report**. The SRRR documents the findings of the SRR survey in accordance with CDRL item number AT03, DID number UDI-AAP-093. The survey follows tentative completion of the site preparation work at the site. It describes the new and remaining site deficiencies which need to be corrected before system delivery. It serves to identify what site preparation work is still required after tentative completion of the site remodeling to make the site ready for the system delivery without problems. This report is presented after the completion of each site readiness review survey. The report states either the SPDIP or the SAP items that have not been accomplished, provides a schedule for completion or an acceptable work around, and provides a statement of risk for each solution. A new SRRR is required at completion of any additional work identified.[26]

58.6 **Calibration/Measurement Requirement Summary (CMRS)**. The CMRS provides a list of all Test Measurement and Diagnostic Equipment (TMDE). The CMRS outlines the measurement parameters, specifies ranges, provides accuracy requirements, and provides calibration intervals for each echelon of measurement. The CMRS is used to assure traceable accuracy of measurement through individual service calibration programs to the National Institute of Standards and Technology or the Naval Observatory.[27]

59. **RESERVED**.

CHAPTER 6. PROJECT FUNDING

60. GENERAL FUNDING STATUS. Funding for the AAS is a responsibility of the Program Manager for Advanced Automation. The AAS is a multiyear program. Funding for each segment is a part of the total AAS Program. This PIP does not address funding for the prime system procurements or include dollar amounts for any portions of the program. It does include the region/facility work efforts that require funding.

61. REGIONAL/FACILITY COST ESTIMATES. AAP-10 with support from the SEI contractor and regions have developed F&E cost estimates for field implementation of each segment of the AAS Program. The descriptions are general and do not cover every cost that can be incurred. Not all categories of costs are applicable to every AAS segment. The estimates include the following categories:

a. Regional office engineering - covers the salary and per diem for regional office F&E personnel.

b. Major site construction (contract) - covers contract awards for major construction.

c. Site preparation - salaries and per diem for field F&E personnel, including materials required.

d. Resident engineers - salaries and per diem for monitoring of major site construction at the facility.

e. Technical Onsite Representative - salary and per diem to monitor electronic installations.

f. Travel - appropriate travel for regional office and facility personnel.

g. Overtime - appropriate overtime for facility operation's personnel.

h. Equipment relocation - relocation of equipment that remains in use but must be moved to allow installation of PAMRI segments.

i. Equipment removal and disposition - equipment obsoleted by the PAMRI is to be removed and disposed of.

62. PAMRI. The cost estimates cover the following requirements:

62.1 Regional Engineering and Field Support. The regions are required to complete the PAMRI site preparation engineering; see paragraph 71. Regional office engineers are required to support the site preparation effort while it is in progress.

62.2 Major Site Construction (Contractor). N/A.

62.3 Site Preparation. The regions are required to prepare the site for the PAMRI through the use of F&E work force or contract. Site preparation details are contained in paragraph 71.

62.4 Resident Engineer. This category is related to major site construction paragraph 62.2 and is not applicable to the PAMRI.

62.5 Technical OnSite Representative. Funds are provided to staff an onsite representative to be at the facility before the equipment arrives and to remain as required until the project is complete. The representative may be an ARTCC employee.

62.6 Travel. To support appropriate meetings, testing, site visits, etc.

62.7 Overtime. Overtime may be required during transition and testing activities of the PAMRI. The use of the overtime is determined by the appropriate region and facilities managers.

62.8 Equipment Relocation. It is not the intent to relocate equipment to install the PAMRI. If the site survey shows that relocations are required, AAP-240 should be advised.

62.9 Equipment Removal and Disposition. The PAMRI project obsoletes the PAM's, DRG's, and RMUX. See paragraph 83.2.11.3 for more detail.

63. F&E PROJECT FUNDING DISTRIBUTION. Funds will be distributed on a fiscal year basis as soon after the start of the fiscal year as possible. Four separate project authorizations (PA) will be issued for the program. The following descriptions are general and not intended to cover every cost category that can be incurred.

63.1 **Personnel Compensation Benefits & Travel (PCB&T).** This estimate includes the following categories (System Code 810):

a. Regional Engineering. This covers salary, per diem, and travel costs for regional F&E personnel. Work category examples include regional engineering, PCB&T expenses for site preparation and resident engineers.

b. Technical Onsite Representatives. Personnel, Compensation & Benefits (PC&B) funding for technical onsite representatives is provided.

63.2 **Travel and Overtime Charges.** This estimate includes funding for nonstandard travel and overtime costs for operations apropriations funded personnel who work on the AAS Program (System Code 840 for AAS and VSCS only).

63.3 **Major Site Construction.** This estimate covers contract awards for major construction.

63.4 **Equipment Material and Services.** This project authorization (PA) is for contracts for material, services, and equipment to support the PAMRI implementation.

64. **PRIME-FUNDED SUPPORT ITEMS ARTCC'S.** The acquisition contract includes options, in one-year increments for up to 9 years, for hardware maintenance, software support, and technical support. These options are in addition to the one-year basic requirement for these services. Extensions of the options to succeeding years are an operational funding responsibility.

64.1 **Support and Services.**[1] The contractor provides support and services for one year. Nine optional years are available. The support and services are:

a. Commercial Software Lease in accordance with SOW paragraph 3.7.4.2.

b. Software Maintenance Support in accordance with SOW paragraph 3.13.1.

c. Engineering Service in accordance with SOW paragraph 3.13.1.

d. Noncommercial Hardware Repair, Restoration, and supply support in accordance with SOW paragraph 3.13.3.

64.2 **PAMRI Training Service.**[2] Contractor provided services are:

a. Training services in accordance with SOW paragraph 3.9.4. The contractor is to conduct up to eight PAMRI Airway Facilities and software Course Sets (with 12 students per Course Set), as detailed in the approved PAMRI Training Plan, at the FAA Academy.

b. Training services in accordance with SOW paragraph 3.9.2 to support FAA Academy training units in the development and modification of PAMRI training materials and courses during all phases of transition.

c. Training services and engineering support in accordance with SOW paragraph 3.9.7 for OT&E and selected FAA Academy students.

d. The approved final version of the PAMRI AF Course Curriculum Material is provided.

64.3 **PAMRI Consumables.**[3] The contractor provides consumable spare parts in accordance with SOW paragraph 3.5.6 for all PAMRI hardware and peripheral equipment in order to provide one year of operation. This includes, but is not limited to, paper, ribbons, magnetic tape media, magnetic tape racks, fuses, lamps, filters, miscellaneous operational materials and expendables.

64.4 **PAMRI Spares.**[4] The contractor provides all spare parts, test equipment, and tools determined by the Government for maintenance of the PAMRI in accordance with SOW paragraphs 3.5.6 and 3.5.7.

65.-69. **RESERVED.**

CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS. AAP-200 has the primary responsibility for conducting the DRR. The DRR supports a determination by the DRR Board and the NAS Program Manager that the PAMRI is ready for delivery to the first operational site. AAP-200 is responsible for leading the review process and presenting a report to the NAS Program Manager. The following lists the various steps included in the DRR process.

a. Validate DRR items in solicitation package (pre-DRR process).

b. Initiate DRR process (initial review and announce DRR team meeting).

c. Convene DRR team meeting (12 months prior to delivery to T&E site).

d. Monthly project checklist updates (every 30 days following initial DRR team meeting).

e. Mid-term review.

f. Delivery to T&E site.

g. Shakedown test completed.

h. Submit DRR report (one week after completion of shakedown test).

i. Deployment decision (DRR EXCOM meeting).

j. System delivered to first operation site or system delivered to AAC.

k. Monthly open action item status reports (every 30 days following deployment decision).

l. Post deployment review.

70.1 Deployment Readiness Review Team. AAP-200 is to establish a DRR team. The following organizations are invited to send a representative to each project DRR team and participate in the process in accordance with the provisions of the order:

FAA Headquarters

Office of the Associate Administrator for NAS Development	AND
Advanced Automation Program Office	AAP
Systems Maintenance Service	ASM
Automation Program Office	ANA
NAS Transistion and Implementation Service	ANS
Office of the Associate Administrator for System Engineering and Development	ASD
Logistics Service	ALG
The Office of Air Traffic System Management	ATM
Air Traffic Plans and Requirements Service	ATR
Flight Standards Service	AFS
The Office of Civil Aviation Security	ACS
The Office of Labor and Employee Relations	ALR
The Office of Human Resource Development	AHD
The Office of Training and Higher Education	AHT
Aviation Standards National Field Office	AVN
Office of Program and Resource Management	APR

FAA Centers and Regions

FAA Technical Center	ACT
Mike Monroney Aeronautical Center	AAC
Airway Facilities Division	All Regions
Air Traffic Division	All Regions
Flight Standards Division	All Regions
Civil Aviation Security Division	All Regions
Logistics Division	All Regions

Others

DOD/NAS Plan Requirements Office	ASD-7
Systems Engineering and Integration Contractor	SEI

70.2 Deployment Readiness Review (DRR) Checklist. This element of the process provides a structure to ensure all significant areas of concern are addressed during the review. The following lists the section numbers and titles of the DRR checklist:

a. Section 1. NAS System Requirements.

b. Section 2. Maintenance Planning.

c. Section 3. Project Implementation.

d.	Section 4.	Contract Status.
e.	Section 5.	Configuration Management.
f.	Section 6.	Facility/Site Preparedness.
g.	Section 7.	Test Program.
h.	Section 8.	Software and Firmware Integration and Maintenance.
i.	Section 9.	National Airspace Integrated Logistics Support (NAILS).
j.	Section 10.	Training.
k.	Section 11.	Staffing.
l.	Section 12.	Communications.
m.	Section 13.	Man-Machine Interface.
n.	Section 14.	Automated Information Systems Security Effectiveness.
o.	Section 15.	General.

71. SITE PREPARATION. The FAA regions are responsible for PAMRI site engineering and preparation. Figure 41-2 shows the timeframes involved. Site engineering and preparation basically provides power, ground, and core drilling if required. Basic requirements are contained in the PIP. Detailed requirements are provided by the contractor through CDRL's, TIM's, and site surveys. The data will be available with sufficient time for the regions to complete the engineering and site preparation. Paragraph 58 describes the various contractual activities that occur preceding, during, and after site preparation.

a. IBM is responsible for all cable conveyances in accordance with the following paragraphs taken from the SPDIP dated April 1, 1989.

b. IBM is to use existing cable conveyances for the installation of new PAMRI cables whenever possible. Any additional cable trays, ladders, conduits, and any other similar conveyances required to affect the equipment installation are provided by IBM who designs or selects them from available vendors. These conveyances are installed at site fit-up by IBM's contractor.

c. The routing of these conveyances are determined when site surveys are performed and in conjunction with ARTCC personnel who can verify the best locations and routes. The proposed routes are then transposed into actual route designs by IBM and documented in the Site Activation Plan.

d. The conveyances are made only as large as necessary for the installation of AAS, incorporating, if applicable, TAAS and ISSS requirements and the contractual growth requirements. The designs are performed after site surveys are completed and are based on system logical designs, ease of installation, individual construction of the ARTCC's, cable design parameters and serviceability considerations.

e. Conveyance installations will be completed in every respect and are constructed and installed, in accordance with the design documents, by a subcontractor, prior to equipment delivery.

f. Any core drilling requirements for the installation of these conveyances will be identified at the time site surveys are conducted. The requirements are formalized and documented by the Site Activation Plan. The preparation of these cable openings is the responsibility of the FAA. All such openings and penetrations must be prepared and ready for use at the Site Readiness Review.[1]

g. Conveyances that are to be removed when ISSS is installed and the CDC/DCC are removed cannot be used for permanent PAMRI cabling.

71.1 **Regional Role.** In addition to providing engineering and the F&E personnel to complete the site preparation or monitor a contractor the region will participate in site surveys, support site preparation as required, and participate in the JAI process.

71.1.1 **Facility Role.** The facility aids the region in data gathering for the engineering, monitors the F&E installation as it relates to acceptance by the sector, coordinates outages if required, and participates in the JAI process.

No. of Cabinets	General Location	Breakers Qty	Poles	Size	#KVA	Height	Width	Depth	Weight per Cabinet
2	Modem Splitter	2	2	15A	.8	48.0"	24"	36.0"	250 lbs
1	NRKM	1	2	15A	.4	48.0"	24"	36.0"	250 lbs
1	CTS	1	2	15A	.4	48.0"	24"	36.0"	250 lbs
1	NADIN	1	2	15A	.4	48.0"	24"	36.0"	250 lbs
1	FDIO	1	2	15A	.4	48.0"	24"	36.0"	250 lbs
1	EDARC	1	2	15A	.4	48.0"	24"	36.0"	250 lbs
1	MSP	1	2	15A	.4	48.0"	24"	36.0"	250 lbs
1	Control Switch SMMC	1	1	15A	120v Single-Phase				
1	Control Switch PAMRI	1	1	15A	120v Single-Phase				

208 volt.

T-Bar Data
Fig. 71-1

71.2 **Requirements.**

71.2.1 **PAMRI Power.** The power requirements for the PAMRI cabinets are provided in chapter 3. The FAA provides the breakers to satisfy the requirements, and the AAS contractor provides and installs the power cables to the cabinets and maintenance monitors.

a. Each cabinet is powered from two critical buses. Each site is surveyed to determine if adequate breakers are available or if additional panels are required. Two 120v single-phase breakers are provided for the convenience outlets on the service bus for the RDDU and AU cabinets. One 120v single-phase breaker is provided for the modem splitters and RDDU.

b. All circuits required must be installed in compliance with Order 6950.15B ARTCC Critical Load Circuits and Configuration.

71.2.2 **Transition Power**

71.2.2.1 **T-Bar Switches.** There is a maximum of eight T-bar cabinets installed to aid transition. The cabinets are installed near the devices as shown in figure 71-1. The switches in the cabinets can be controlled at the cabinets or from the SMMC or PAMRI. Site surveys are required to determine the final location, number of breakers, and power availability. Figure 71-1 shows circuit breaker requirements. AAP-240 is responsible for ensuring that a national policy on power for testing and for operational use is developed. If an NCP is required to place the transition switches, including 3814's, on critical power, it is to be completed by AAP-240.

71.2.2.2 **IBM 3814 Switch.** Three IBM 3814 switches are installed in the Host area. One 3180 Keyboard Video Display Terminal (KVDT) is installed with the switch and one at the SMMC. Power requirements and cabinet dimensions are shown in figure 71-2. The switches (3814's) should be powered from three separate buses for redundancy purposes similar to the Host installation.

71.2.3 **Signal Cable.** The contractor provides and installs all signal cabling. All PAMRI cabinets have bottom access.

72. **DELIVERY.** The following paragraphs describe the major FAA and contractor activities and prerequisites for PAMRI delivery to each site. Prerequisites are the same for all sites except the first one which requires completion of a DRR. See paragraph 70. Figure 41-2 lists the PAMRI sites and planned delivery dates for each site.

72.1 **Overview.** Delivery involves shipping PAMRI components and support material from the points of

No. of Cabinets	Ckt. Volts	Breaker Qty	Poles	Bkr. Size	Height	Width	Depth
3814 A01	208	1	2	20	47.5"	48.75"	32"
3814 A01	208	1	2	20	47.5"	48.75"	32"
3814 B01	208	1	2	20	47.5"	48.75"	32"
3180 KVDT SMMC	120	1	1	15			
3180 KVDT Switch	120	1	1	15			

IBM 3814 Data
Fig. 71-2

assembly to the loading dock at each facility. Movement of all material from the loading dock to installation areas is prescribed in the SAP (CDRL AT01). Major permanent deliverables include the following:

a. Adapter Unit Cabinets. (4 ea.)

b. Modem Splitter Cabinets. (2 ea.)

c. Radar Data Distribution Unit Cabinet. (1 ea.)

d. Tables. (3 ea.)

e. Maintenance Consoles. (3 ea.)

f. Printers. (3 ea.)

g. Installation and test materials.

h. Training materials.

i. Documentation.

j. Site-Specific Software Adaptation Packages.

k. Intra-connecting signal and power cables. These may be delivered and installed prior to the delivery of major PAMRI units.

72.1.1. Adjusted adapter modem quantities are shown in figure 72-1.[2] GPO/GPI adapter quantities are shown in figure 33-1.

72.1.2 Major transition deliverables include the following:

a. IBM 3814 switches. (3 ea.)

b. T-Bar switches. (8 ea. maximum)

c. KVDT 3180. (2 ea.)

d. Controller for T-Bar switches.

e. Intra-connecting signal and power cables. These may be delivered and installed prior to the delivery of major PAMRI units.

72.2 **Prerequisites.** The following action must be completed prior to delivery of the PAMRI.

SITE	INTI	INTO	COMM SPLITTER	RADAR CHANNELS	RADAR SPLITTER	TOTAL RACKS
ZSE	14	14	7	39	13	2
ZTL	32	32	16	39	13	2
ZAU	27	27	14	30	10	2
ZFW	21	21	11	60	20	2
ZOB	26	26	13	33	11	2
ZHU	25	25	13	45	15	2
ZDV	15	15	8	42	14	2
ZDC	36	36	18	33	11	2
ZLC	15	15	8	60	20	2
ZNY	19	19	10	30	10	2
ZKC	22	22	11	48	16	2
ZMP	28	28	14	48	16	2
ZAB	19	19	10	60	20	2
ZOA	28	28	14	45	15	2
ZME	21	21	11	42	14	2
ZLA	35	35	18	42	14	2
ZMA	19	19	10	39	13	2
ZID	23	23	12	27	9	2
ZJX	32	32	16	39	13	2
ZBW	22	22	11	36	12	2

Adapter Modem Quantities
Fig. 72-1

72.2.1 **Site Preparation.** Site preparation must be completed in accordance with paragraph 71, CDRL AT03 Site Readiness Review Report, and CDRL AT01 Site Activation Plan.

72.2.2 **Site Requirements.** The FAA onsite coordinator ensures that the following actions have been completed:

a. Contractor has provided names of installation team members.

b. Space is available for delivery vans.

c. Loading dock space is available.

d. Appropriate disposal facilities are available for excess packing material, etc.

e. Parking space is available for contractor personnel.

f. Space for storage, maintenance, telephone and offices are available in accordance with the contract. See figure 72-2.

	Months From Site Delivery													
	-4	-3	-2	-1	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
Facilities														
Offices#														
Manager					1	1	1							
Staff					1	1	1	1	1	1				
Offices include furniture, locks, copier access, telephones, and file cabinets.														

The space to be provided in proximity to the computer facility, but not necessarily in the same building.

Figure 72-2 Facility Resources

72.2.3 Planning Documentation. The following documents should be completed and available in the timeframe required.

a. FAA.

(1) NAS, regional, and facility transition plans.

b. Contractor.

(1) AAS Transition Plan CDRL AT05.

(2) Site Preparation Design Information Plan CDRL AT02.

(3) Site Activation Plan (SAP) AT01.

(4) Site Readiness Review Report (SRRR) AT03.

(5) AAS Training Plan CDRL TR06.

(6) PAMRI Test Planning CDRL TE35, 36, 37.

c. ACT.

(1) Baseline Testing. Required hardware and software baseline testing at the ACT is completed prior to the first site delivery.

(2) Operational Testing. Required OT&E testing is completed prior to first site delivery.

(3) Software Testing. Required site specific software testing at the ACT is completed prior to each site delivery.

72.2.4 Delivery Approval. The AAPO approves shipment of PAMRI material to all ARTCC sites.

72.3 Packing and Transportation. The contractor packs and crates material as defined in the AAS System Level Specification and/or AAS Contract. The contractor is responsible for making all necessary transportation arrangements for PAMRI delivery. Equipment damaged, while in transit, is the sole responsibility of the contractor.

72.4 Delivery Process. The following subparagraphs describe the PAMRI delivery process at ARTCC's.

72.4.1 Offload. The contractor provides the personnel and devices (forklifts, dollies, and tools) to unload vans, unpack crates, dispose of packing material and deliver equipment/material to emplacement areas. The FAA provides site security (badges/escorts/observers), delivery dock access, and delivery routes (internal and external).

72.4.2 Inspection and Inventory. The contractor uncrates, inspects, and inventories each item. The FAA witnesses this activity and verifies the inspection and inventory.

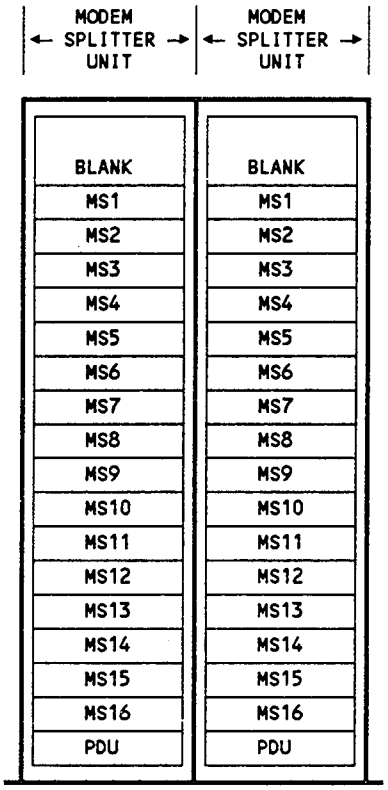
72.4.3 Internal Delivery. The FAA onsite coordinator verifies that delivery routes and emplacement areas are ready for delivery. The contractor delivers PAMRI equipment/material to emplacement areas as items are inventoried.

73. INSTALLATION. The contractor emplaces the PAMRI equipment as described in paragraph 72 and the transition switches as described in paragraph 71. Figure 73-1 shows the layout of the modem splitters.

a. Paragraph 32.1.1 describes positioning of the modem splitter racks

b. Figure 73-2 shows the layout of the AU racks with side access and monitor console tables. Paragraph 32.1.2 describes positioning of the AU racks and monitor console tables.

c. Figure 73-3 shows the layout of the RDDU rack and monitor console table including side access.



Modem Splitters
Fig. 73-1

d. Paragraph 32.1.3 describes the positioning of the RDDU rack and monitor console table.

73.1 **Signal Cabling.**

73.1.1 **RDDU.** Figure 73-4[3] shows the permanent and transition cabling strategy required to install the radar modem splitters and RDDU. Three modem splitters channels are required for each radar.

a. The contractor provides and installs cables 1, 2, and 3. Cable 4 is the existing cable. After transition is complete cables 3 and 4 are removed by the contractor. Figure 73-5[4] shows the output of the RDDU connected to the simulation switch on the EDARC.

b. Figure 72-1 shows the number of interfaces to be serviced at each ARTCC.

c. The RDDU installation may be completed prior to the AU installation.

73.1.2 **T-Bar Switches.**

73.1.2.1 **GPO/GPI Adapters.** Figure 73-6[5] shows the permanent and transition cabling strategy to install the GPO/GPI adapters and transition switches. Figure 33-1 shows the number of GPO/GPI adapters to be provided each ARTCC. The contractor provides and installs all cables shown on figure 73-6 except cable 4 which is the existing cable. After transition, cable 1 is reterminated on the device and all other cabling and the switch are removed by the contractor.

73.1.2.2 **INTO/INTI Adapters.** Figure 73-7[6] shows the permanent and transition cabling strategy required to install the INTO/INTI adapters, T-Bar switch, and communications modem splitters.

a. The contractor provides cables 1, 2, 3, and 5. Four is the existing cable. When transition is completed, cable 2 is connected from the modem splitter to the modem. The contractor removes cables 3 and 5 and the switch.

b. Figure 72-1 shows the number of INTO/INTI adapters to be furnished each ARTCC.

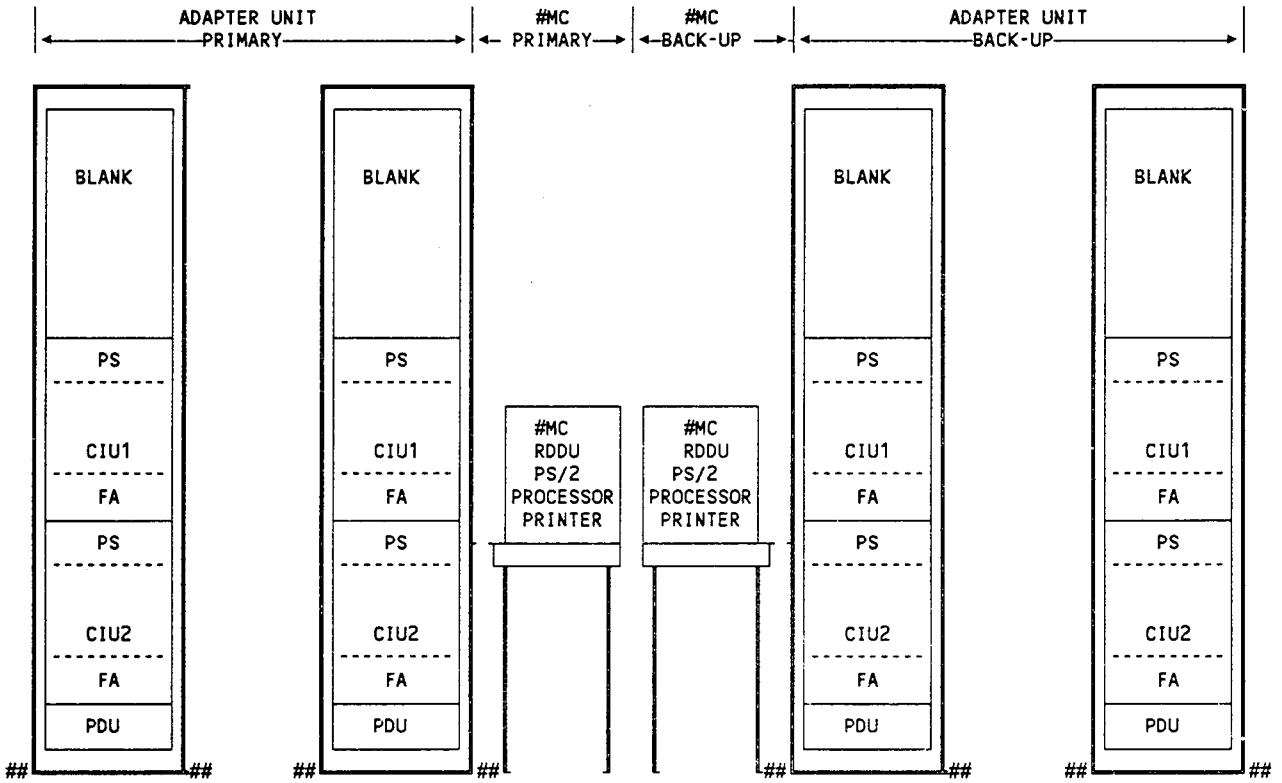
73.2 **IBM 3814 Switch.** Figure 73-5 shows the switch as S-2. It is installed as a switching interface between either the PAM or PAMRI and the Host. The contractor installs the switch, cabling, one 3180 KVDT on the 3814, and one KVDT 3180 at the SE position. When transition is complete AU-1 and AU-2 are reterminated on host A&B. The contractor removes the switch, cabling, and KVDT's.

73.3 **Coded Time Source (CTS).** CTS data interfaces through a GPI adapter to the PAMRI from the existing CTS. Replacement of the existing CTS is a separate project. The CTS is to be provided by IBM no later than the ISSS delivery date.

73.4 **Installation Sequence and Site Verification.** Paragraph 83 describes the installation sequence and site verification through ORD.

74.-79. **RESERVED.**

PAMRI Rack Layout
Fig. 73-2

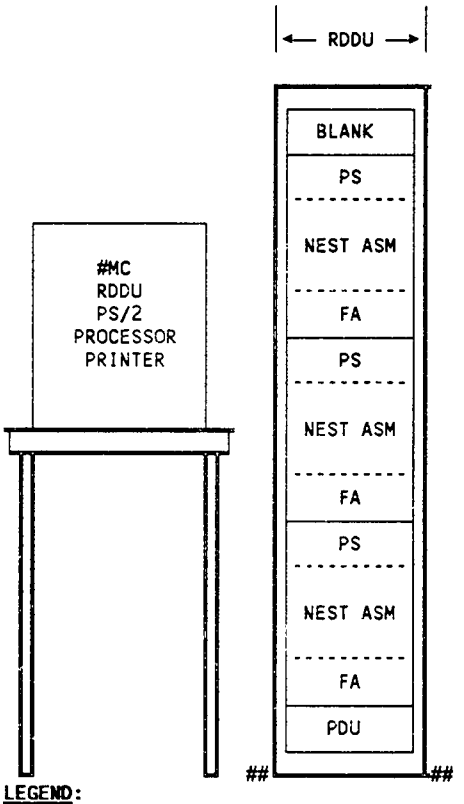


PAMRI SITE CONFIGURATION
(Shown Without EMI Covers)

LEGEND:

#	=	Exact Configuration Not Available
PS	=	Power Supply
CIU	=	Common Interface Unit
FA	=	Fan Assembly
PDU	=	Power Distribution Unit
MC	=	Maintenance Console
PS/2	=	IBM Model 55
##	=	Side Access Required on Both Sides Exact Dimensions TBS

RDDU Rack Layout
Fig. 73-3



LEGEND:

#MC	=	Maintenance Console Exact Configuration TBS
PS	=	Power Supply
PDU	=	Power Distribution Unit
##	=	Side access required on both sides. Exact Dimension TBS.

Radar Modem Splitter Cabling
Fig. 73-4

THE FOLLOWING CABLING STRATEGY IS PROPOSED FOR THE CD INTERFACES:

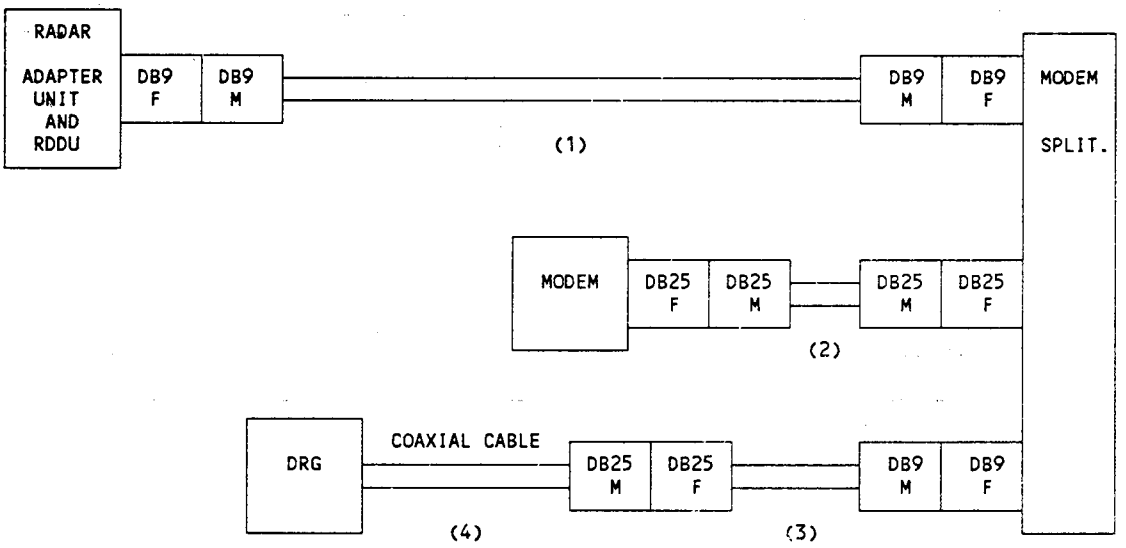
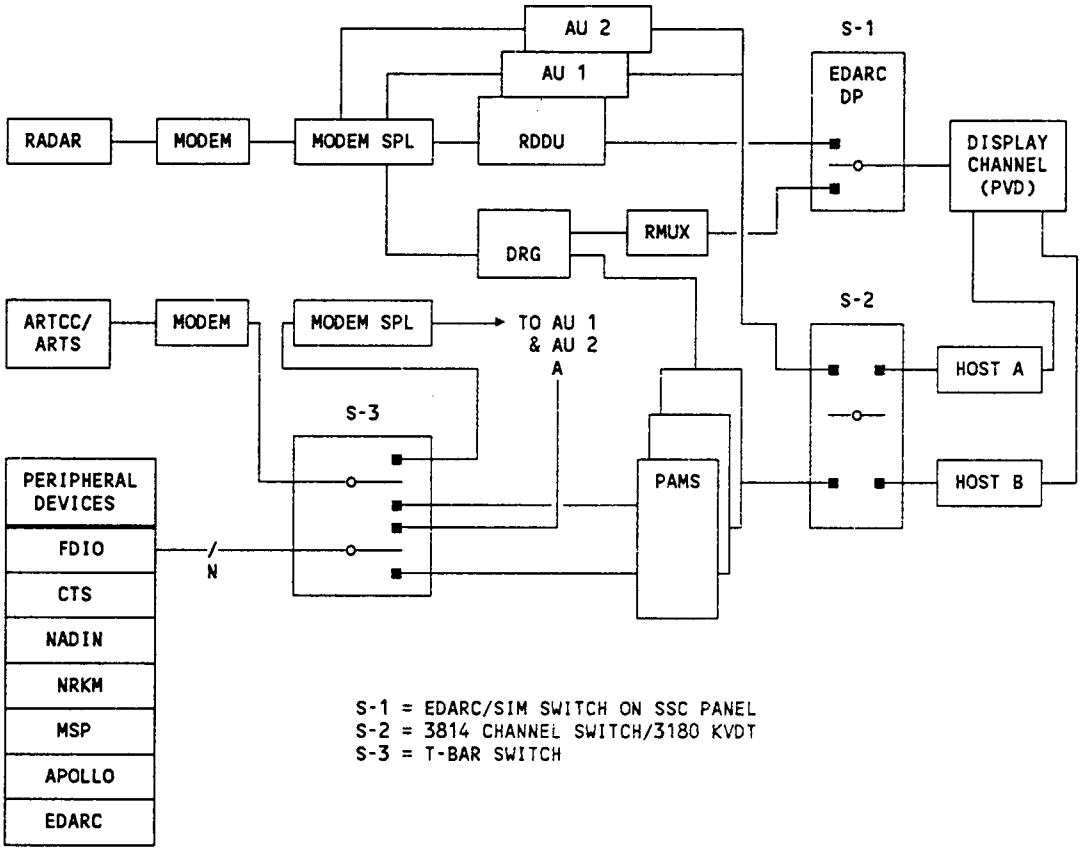


DIAGRAM NUMBERS 1-3 MUST BE MADE, 4 IS THE EXISTING CABLE.

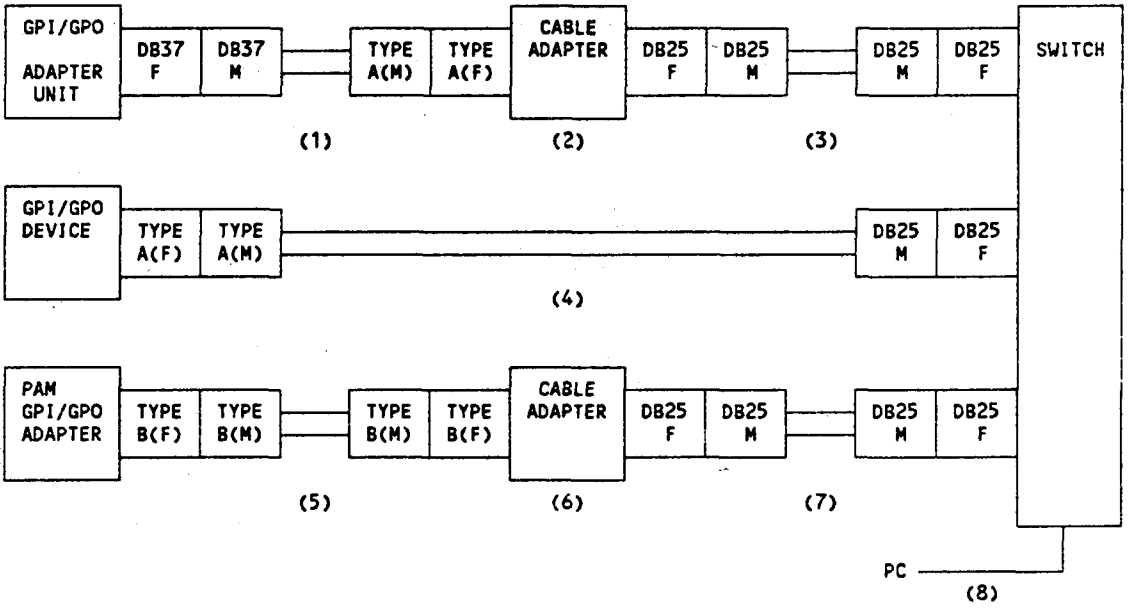
AFTER TRANSITION, REMOVE CABLES 3, 4, AND THE DRG.

PAMRI Architecture Transition Cabling
Fig 73-5



GPO/GPI Cabling
Fig. 73-6

THE FOLLOWING CABLING STRATEGY IS PROPOSED FOR THE GPI/GPO INTERFACES:



TYPE A: THIS CONNECTOR MAY BE MALE OR FEMALE. THE ACTUAL POLARITY WILL CHANGE ON A DEVICE BY DEVICE BASIS. ALSO, THE ACTUAL TYPE OF CONNECTOR VARIES.

TYPE B: TYPICALLY A HALF SERPENT CONNECTED TO THE PAM TAILGATE ASSEMBLY, CURRENTLY ON THE EXISTING CABLE ASSEMBLY AND IS SHOWN HERE FOR REFERENCE PURPOSES ONLY.

DIAGRAM NUMBERS 1-3 AND 7 MUST BE MADE, 4 IS THE EXISTING CABLE.

AFTER TRANSITION, INSTALL CABLE 1 INTO THE DEVICE, THEN REMOVE THE REST.

INTO/INTI Cabling
Fig. 73-7

THE FOLLOWING CABLING STRATEGY IS PROPOSED FOR THE INTI/INTO INTERFACES:

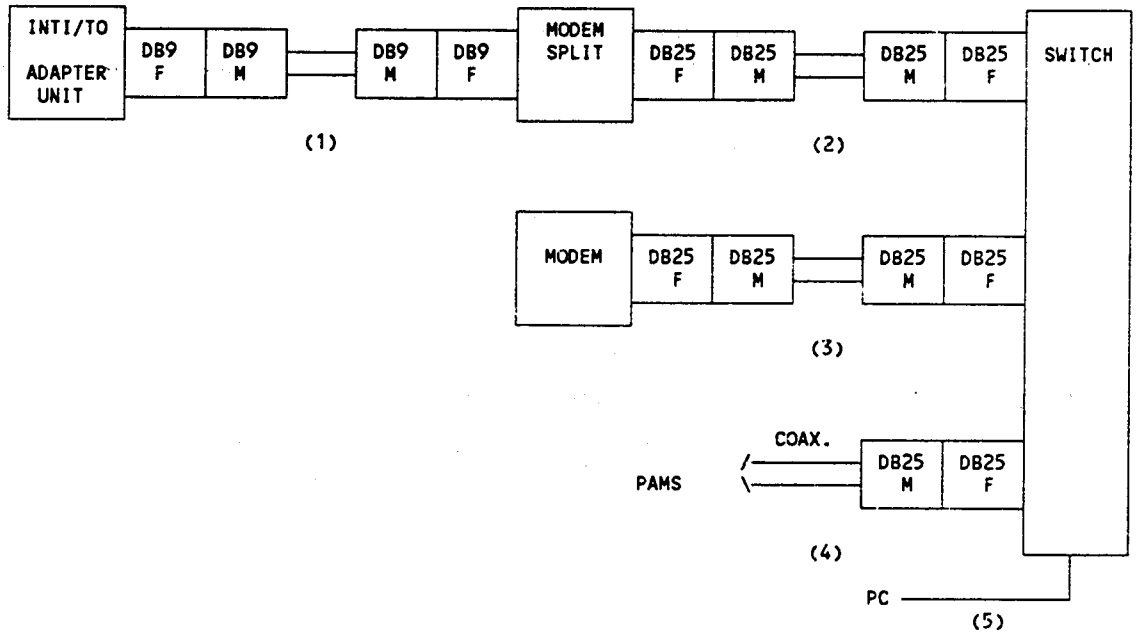


DIAGRAM NUMBERS 1-3 AND 5 MUST BE MADE, 4 IS THE EXISTING CABLE.

AFTER TRANSITION, REMOVE THE SWITCH, CABLE 4 AND CABLE 3, AND CONNECT CABLE 2 TO THE MODEM.

CHAPTER 8. VERIFICATION

80. GENERAL VERIFICATION ASPECTS. The PIP divides the discussion of the verification of the PAMRI into three major sections according to the location of the test and verification activities.

80.1 PAMRI Factory Testing. IBM subcontracted design and manufacture of PAMRI to the Formation Corporation, Mt. Laurel, N.J. IBM and Formation requested and the FAA approved a plan to complete partial factory testing at ACT rather than at contractor facilities. This approach allows PAMRI interface with GFE and with NAS software as modified for PAMRI earlier in design and development stage. The contractor delivered an engineering model to the ACT in June 1989, a pre-production model in August 1989, article one on February 1, 1990, and articles 2 and 3 on June 1, 1990. No change is proposed for field facilities delivery.

80.2 Site Testing. Figure 80-1 shows the three major areas and the types of testing normally conducted at each site. The identified paragraphs provide additional information. The contractor involvement column of figure 80-1 is interpreted as follows:

Par #	Test Location	Cntratr Invlvmt	Test Types
81	Factory	Conduct	Production Acceptance Test & Evaluation
		Conduct	#Factory Partial System Test
		Conduct	Factory Full System Test
		Conduct	#First Article Test
		Conduct	##Factory Qualification Test
82	FAATC	Conduct	Installation and Integration
		Conduct	System Test
		Conduct	Acceptance Test
		Conduct	Development Test & Evaluation
		Support	Operational Test & Evaluation
83	Sites	Conduct	Checkout
		Conduct	Contractor Integration Test
		Conduct	Contractor Acceptance Inspection (CAI)
		EngSupt	FAA Integration Testing
		EngSupt	Certification
		EngSupt	Initial Operating Condition (IOC)
		EngSupt	Operational Shakedown
		EngSupt	Joint Acceptance Inspection (JAI)

\# Partially conducted at ACT
\## Conducted at ACT

Test Site Matrix
Fig. 80-1

a. Conduct. The contractor develops and conducts the indicated test activities.[1]

b. Support. The contractor supplies all resources to the extent specified in the contract to assist the FAA as required in the conduct of the indicated tests.[2]

c. Engineering Support. The contractor provides engineering support to the extent specified in the contract.[3]

80.2.1 Testing proceeds from the contractor's factory to the ACT to the site. The DRR falls between ACT testing and site testing. The DRR supports a determination by the DRR Board and the NAS Program Manager that the PAMRI is ready for delivery to the first operational site. Paragraph 70 provides a description of the DRR process.

81. FACTORY VERIFICATION. The FAA and the contractor conduct formal factory testing and verification at the contractor's plant.

81.1 Contractor Factory Testing. The contractor develops, conducts, and maintains the PAMRI test and evaluation program. Tests are conducted using FAA-approved test plans and procedures. The contractor analyzes all test results and test data and prepares test reports. The contractor maintains logs of formal tests. The logs are made available to the FAA within 2 days of test completion.[4] The following subparagraphs discuss the five categories of contractor-conducted, formal testing for the PAMRI at the factory. Figure 81-1 shows an overview of these five areas.

81.1.1 Production Acceptance Test and Evaluation (PAT&E).[5] PAT&E is that T&E conducted to verify that the production items fulfill the requirements and specifications of the procuring contract or agreement. NOTE: The differences between the scope of Development Test and Evaluation (DT&E) and PAT&E depend on how much testing was done and on how much the test articles have changed. The contractor performs and the FAA verifies all PAT&E tests. PAT&E should be conducted on production items to determine whether serial production items are the same quality, have the same technical and operational characteristics, incorporate specified improvements, and are as consistent as items that have been previously tested and accepted.

Par. Number	Test Category	Major Test Characteristic
81.1.1	Production Acceptance and Evaluation (PAT&E)	Tests noncommercially available hardware manufactured for AAS
81.1.2	#Factory Partial System Test	Normally a subset of full factory test. Tests will be delivered for PAMRI.
81.1.4	Factory Full System Test	There are no factory system tests for PAMRI SOW Para 3.6.3.1.2.
81.1.5	##First Article Test (FAT)	Testing of the first items of a type produced
81.1.6	#Factory System Qualification Test (FSQT)	Completed prior to shipment of PAMRI to ACT

\# Completed at ACT (cf. 81.1.3.2)
\## Partially completed at ACT

Factory Testing Summary Chart
Fig. 81-1

PAT&E is limited to the production and deployment phase of a program.

81.1.1.1 **PAT&E Objectives.**[6]

a. Ensuring that all delivered items have been properly produced, installed, and operate as specified.

b. Demonstration, through IOC, that installation has been successful and in accordance with specifications.

c. Verification of specified consistency from item to item.

d. Demonstration that support items such as simulators, logistics, support equipment, and manuals are technically compatible and according to specifications.

e. Verification of specified safety requirements.

f. Determination that the system meets reliability specifications.

g. The accumulation of data to refine the logistics supportability of the system.

81.1.2 **Factory Partial Systems Tests.** Factory partial tests consist of hardware and software tests.[7]

81.1.2.1 **Hardware Tests.**[8] Hardware tests requirements in AAS SLS Section 4.4.1.1.4.1 apply to the PAMRI.[9] These include:

a. Configuration Item (CI) tests of noncommercially available hardware.

b. Electromagnetic radiation tests.

c. Environmental tests.

d. Safety tests.

e. Commercially available hardware verification.

f. Preproduction reliability qualification.

81.1.2.1.1 **Fabrication Inspection.** The noncommercially available and modified off-the-shelf hardware provided by the contractor are given a mechanical and an electrical inspection.[10]

81.1.2.1.2 **Mechanical Inspection.** The mechanical inspection consists of a visual examination to ensure that the contractor's specifications are in compliance with the requirements specified in section 50.3.3 of the SLS and for the specific following items:[11]

a. Strength and rigidity.

b. Accessibility.

c. Components and materials.

d. Insulation.

e. Chassis layout.

f. Panels and wiring.

g. Warnings and safety markings.

h. Finishes.

i. Workmanship.

j. Interchangeability and modularity.

k. Nameplates and equipment marking.

l. Human engineering.

81.1.2.1.3 **Electrical Inspection.** The electrical inspection includes tests to determine compliance with the contractor's specifications. The contractor provides the required test equipment. Testing of the electrical

requirements and performance consists of, but not be limited to, the following items:[12]

a. Electrical continuity.

b. Leakage resistance.

c. Power supply voltages.

d. Power supply regulation.

e. Direct Current (DC) frame group.

f. Electrical safety.

81.1.3 Software Tests. The software tests consist of diagnostic and systems build support software tests.[13]

81.1.3.1 Diagnostics. Tests are conducted to verify that the PAMRI meets the requirements for maintenance and diagnostics as specified in the SLS.[14] The tests are equal to or better than the existing Maintenance Diagnostics Monitor (MDM) diagnostics. These tests are performed for, but not limited to, the following items:

a. Displays.

b. Data entry devices.

c. Processors.

d. Memory.

e. Mass storage devices.

f. Power supplies.

g. Peripherals.

h. Radar interface adapters.

i. EDARC interface adapters.

j. Peripheral interface adapters.

k. Data communication equipment.

l. Functional elements.

m. DCU interface adapters.

n. SMMC interface adapters.

o. Transportable Radar Analysis Computer (TRACS) interface adapters.

This testing verifies the use of specialized test equipment, diagnostic hardware, and diagnostic software. Failures, both single and multiple, are induced for each test case to demonstrate maintenance procedures for correcting the faults.

81.1.3.2 System Build Support Software Tests (To be completed at the ACT). Tests are conducted to verify the capability to build the NAS operational system to be used during the FSQT and ACT tests. The tests are designed to verify that the present system build and system utility support software capabilities available on the HCS have been retained.[15] The NAS operational system resulting from this build is used during the conduct of the FSQT. Any modifications to the NAS operational system necessary for the conduct of the ACT tests are identified and submitted to the Government for their review; such modifications may require verification of the NAS operational system. The NAS operational system is built using the Universal Data Set (UDS) adaptation for ATC. Both a Computer Display Channel (CDC) and a Display Channel Complex (DCC) operational system build are demonstrated.

81.1.4 Factory Full System Test. There are no full factory tests for PAMRI.[16]

81.1.5 First Article (Partially completed at the ACT). The contractor develops and conducts first article testing for the first production items manufactured specifically for the AAS. The testing will be completed at the factory except as noted in paragraphs 81.1.3.2 and 81.1.6. Testing complies with:[17]

a. FAA-STD-016, Quality Control System Requirements.

b. The Quality Control System Plan.

81.1.6 Factory System Qualification Test (To be completed at the ACT).[18] The FSQT is conducted after all other factory tests have been successfully completed. The FSQT is normally the final factory test that must be successfully completed prior to the authorization by the FAA for shipment to the ACT. The FSQT is conducted with a background of realistic operational data provided via a Government-approved simulation scenario. The scenario includes messages and data that exercise the PAMRI interfaces. UDS is used to establish the appropriate test conditions. The tests are conducted using simulated inputs that result in the correct operational system response.

a. The NAS operational system resulting from the system build support software tests is used to conduct the FSQT. The functional baseline scenario (8500 series) used during the HCS testing is modified to accommodate the PAMRI functions. Modifications to the functional baseline are submitted to the Government for approval prior to the conduct of the test.

b. The FSQT uses the Looped Sim capability of the PAMRI. The NAS operational software runs in the HCS primary processor. The Looped Sim Driver (SDR) runs in the HCS support processor. System Analysis Recording (SAR) is activated during the test. Data Analysis and Reduction Tool (DART) and other Data Reduction and Analysis (DR&A) methods are used for reduction of SAR data. Specific DART options include track, log, and flight. The FSQT is considered complete after the reduced SAR data has been analyzed. Any discrepancies are fully documented and explained. The specific explanation and proof provided must be approved by the Government prior to considering the test satisfactory. Moreover, the test is run again, if deemed necessary by the Government, to demonstrate proper functional operation.

81.1.7 **FAA Factory Testing.** AAP-200 has the primary responsibility for PAMRI factory testing. The Government is responsible for:[19]

a. Monitoring the overall quality assurance program for effective implementation and operation.

b. Reviewing and approving all contractor-supplied quality assurance documentation, including the Master Test Plan, other test plans, test descriptions, test procedures, scenario data, and test data collection procedures.

c. Overseeing the operational and maintenance of Government-furnished property.

d. Providing representatives to observe tests requiring Government witnesses.

e. Providing Government-supplied scenario data for test and evaluation.

f. Inspecting subcontracted goods and services at the subcontractor's facilities.

g. Attending the test preparation reviews and post test briefings.[20]

82. **ACT VERIFICATION.** This paragraph discusses verification at the ACT.

82.1 **Contractor.** The contractor develops and conducts a test and evaluation program at the ACT for PAMRI.[21]

82.1.1 **Installation and Checkout (I&CO).** Tests are conducted on each of three systems to be installed at ACT.[22] The tests verify that the PAMRI hardware and software are functioning correctly and are ready to begin interface and integration testing with GFE.[23]

82.1.2 **Interface and Integration.** After successful completion of I&CO the contractor verifies that:

a. Interfaces work with GFE as required.

b. Neither hardware nor software derogate the operation of the GFE.

c. The hardware and software are performing in accordance with design requirements.

d. The PAMRI includes any equipment necessary to effect transition from existing PAM's.[24]

e. Testing verifies the transition staging process and allows a smooth installation with minimum interruption of present operation at the ACT.

f. The capability exists to revert to the original PAM throughout the PAMRI installations and integration.[25]

g. Full operation of all interface can be maintained at each stage of the transition.[26]

h. Electromagnetic radiation emission and susceptibility requirements are met.[27]

82.1.3 System Test. The contractor conducts system test at the ACT. The system test is divided into 12 major test areas. Figure 82-1 summarizes these test areas. The following subparagraphs provide a brief description of each area.[28]

Paragraph No.	Test Area
82.1.3.1	Host Baseline
82.1.3.2	Host Operational Monitor
82.1.3.3	Functional
82.1.3.4	Failure/Recovery/Reconfiguration
82.1.3.5	Capacity and Response Time
82.1.3.6	On-line Certification
82.1.3.7	Failure Mode
82.1.3.8	Maintenances
82.1.3.9	EDARC
82.1.3.10	Stress
82.1.3.11	Site Simulation
82.1.3.12	Support Software

Systems Test Areas
Fig. 82-1

82.1.3.1 Host Baseline Tests. The Host baseline tests are conducted to perform both comparison data collection runs and regression runs.[29]

82.1.3.1.1 Comparison Data Collection Runs. The comparison data collection runs establish performance baseline on the HCS with the PAM's against which PAMRI performance can be compared.

82.1.3.1.2 Regression Runs. The regression runs establish the fact that the present capabilities on the HCS have been retained. The regression runs include:

a. Virtual Machine Control Program (VMCP).

b. Support/Maintenance Monitor.

c. Reconfiguration.

82.1.3.2 Host Operational Monitor Tests. These tests are conducted to verify that the new and/or changed functions of the HCS monitor required for the PAMRI operate correctly.[30]

82.1.3.3 Functional Tests. The Host baseline functional test data are used as comparison data against output of these tests. The Plan View Display (PVD) presentation is monitored to ensure that corrected outputs are displayed. Any discrepancies between the Host baseline data and PAMRI test data must be explained and documented. Specific explanations and proof must be provided to satisfy the Government before the test is considered a success.[31]

82.1.3.4 Failure/Recovery/Reconfiguration Tests. Tests are conducted to verify that the PAMRI meets the requirements for failure detection, failure recovery, and manual reconfiguration. The tests include fault insertion to verify that failure detection, fault isolation, and automatic reconfiguration requirements are met for the PAMRI. Test scripts contain manual entry of reconfiguration commands for all reconfigurable units for each PAMRI configuration. This testing addresses all required interface in Section 50.3.1.4 of SLS. All tests are conducted with the operational software executing with the Functional Baseline 500 scenario running as background.

a. Communication errors are induced into each of the specified communication paths. The errors induced are input and output types for each communication path. The tests demonstrate that the following actions take place:

(1) The error is detected.

(2) For reconfiguration resource failure:

(a) The failure is verified.

(b) The failed resource is removed from the system.

(c) A replacement is reconfigured.

(d) The error message is output.

(3) An alternate means to accomplish the communication is selected.

(4) The communications are successfully completed and processed.

b. Tests to verify the correct operation of the PAMRI in response to the failure and subsequent recovery of major elements are conducted. The tests are run with the full PAMRI configuration available at the ACT, including all external interfaces. The HCS support processor is executing a minimum of two representative tasks during the testing.

c. Tests of the failure and recovery of major elements include, but are not limited to, the following:

(1) Complete failure of the HCS primary processor.

(2) Complete failure of communications from/to external systems.

(3) Complete failure of communications from/to peripheral devices.

(4) Complete failure of communications from the Common Digitizer.

(5) Complete failure of communications to the EDARC system.

d. Tests to verify the manual entry of reconfiguration commands include commands to reconfigure each PAMRI functional element from the primary to the backup function. These commands include the replacement of the entire PAMRI primary element with the backup element. Commands are also entered to demonstrate the replacement of reconfigurable units within the PAMRI primary element.[32]

82.1.3.5 **Capacity and Response Time Tests.** Capacity and Response Time Tests conducted at ACT verify the ability of the PAMRI to meet the performance requirements defined in Sections 2 through 4 of NAS-MD-318. Testing is conducted for the PAMRI configuration using Government- furnished 600-track workload scenarios.[33]

82.1.3.6 **On-line Certification Test.** The PAMRI portion of the NAS On-line Certification (OLC) capabilities provide all the tools necessary to provide test inputs on a real-time basis and to collect data to determine the performance of the PAMRI. The PAMRI OLC Test does not interfere with the operational use of the system, and the test is run concurrently with the existing system.

a. The OLC Test for the PAMRI accepts commands input from any adapted work station to perform the certification test. The outputs and results of the OLC Test are available on any adapted work station or any appropriate device. The OLC Test includes, but is not limited to, the equivalent of all the adapter types: (1) GPI; (2) GPO; (3) INTI; (4) INTO; and (5) Radar.

b. The test includes all interfaces of each equivalent adapter type. Visual or hard copy evidence at the appropriate device is present regarding the OLC Test being conducted.

c. The test induces faults and errors to verify the OLC performance on the functional elements, the control functions, and the interface to include the appropriate devices with degraded functions. Test cases include single and multiple errors and faults across units and subsystems.

d. The run time of each segment of the PAMRI portion of the OLC is equal to or less than the run time of the equivalent segments of the PAM portion of the OLC for the HCS.[34]

82.1.3.7 **Failure Mode Tests.** A series of Failure Mode Tests is performed on the PAMRI to determine the system's reaction to combinations of stressful inputs and load conditions, and to verify or uncover problems with the recovery mechanisms of the PAMRI. A failure mode/recovery analysis that defines and interrelates the fault detection, error processing, and recovery mechanism for every category of failure modes is used as the basis for the tests. The tests also include test candidates supplied by the FAA. Since the intent of these tests is to cause failures by over-stressing the system, such failures are not counted against the quantitative requirements demonstration. Failure Mode Tests are performed at the ACT. A subset of these test cases are performed at each ARTCC.[35]

82.1.3.8 **Maintenance Test.** Maintenance tests are conducted on the peripheral equipment interfaces (GPI/GPO), interfacility interfaces (INTI/INTO), radar interfaces, SMMC interface, DCU interface, and EDARC interface configurations of the PAMRI. Testing includes the use of NAS maintenance software, or a Government-approved replacement.

a. The NAS maintenance software to be demonstrated includes both Test and Maintenance programs and Radar Data Analysis programs. The Radar Data Analysis programs utilizing TRACS is demonstrated with the PAMRI.

b. Data collected during the Host Baseline Maintenance Software Test are used as comparison data against the outputs resulting from this test. Any non-compares between the Host Baseline data and PAMRI test data are fully documented and explained. The specific explanation and proof provided must be approved by the Government prior to having the test considered satisfactory. Moreover, the test is run again, if deemed necessary by the Government, to verify proper functional operation.[36]

82.1.3.9 EDARC Tests. Tests are conducted at the ACT to verify that the PAMRI meets the requirements for operating with EDARC.

a. These tests verify the capability of each PVD, upon controller selection, to present the situation display and provide for the entry of input messages when the situation display is derived from EDARC.

b. During the test, with the PAMRI operations, each operational situation display is individually switched to EDARC until all displays are derived from EDARC. All displays remain in the EDARC mode for a minimum of 30 minutes to allow for data collection and then are switched back to normal operations (i.e., the displays are derived from the HCS computer).

c. A regression test of the EDARC operational and maintenance software with the PAMRI connected is conducted. The testing concentrates on activities and messages related to the GPO, GPI, and radar interfaces from/to the EDARC.[37]

82.1.3.10 Stress Tests. Tests are performed to verify that each PAMRI functional element performs according to the maximum characteristics described in Section 50.3.2.1.2 of the SLS and its subsections. Simulation may be used to produce the necessary data rates. The method used to produce the simulation is approved by the Government prior to the start of the test.[38]

82.1.3.11 Site Simulation Tests. Site Simulation testing is performed on a PAMRI at ACT. The operational systems used for the tests are adapted to realistically simulate operation, as a minimum, at the first two CDC's and the first two DCC ARTCC's. Recorded data from live operations at the ARTCC's are used to drive the systems. All requirements of system installation, commissioning, maintenance, and operation are verified. These systems are operated for 8 hours a day in the simulation mode for 4 weeks. In addition, a continuous operations demonstration of 24 hours per day for one week's duration is performed on the system at the ACT.[39]

82.1.3.12 Support Software Tests. A series of Support Software Tests are conducted to verify that the present capabilities of the Support Software have been retained. A Government-approved subset of the support programs tested during the HCS Support Software Test are demonstrated. The subset includes those support programs that have been modified to operate with the PAMRI. The Government-approved subset of support programs is demonstrated using the HCS interfacing with the PAMRI. In addition, those support programs which have been modified are baselined using the HCS interfacing with the PAM's. The baseline is the unmodified support programs tested in a manner similar to the testing conducted on the HCS. The unmodified support program baseline data are compared to the modified support program PAMRI data. Any non-compares are fully documented and explained.[40]

82.1.4 ACT Acceptance Test. The ACT Acceptance Test is conducted after all other ACT system tests have been successfully completed. This acceptance test is conducted using the maximum actual PAMRI peripherals and PAMRI system interfaces, specified in 50.3.1.4 available at ACT. The ACT Acceptance Test is conducted using the Host Recorded Live Radar Test as a basis, with the addition of test cases unique to ACT test configurations. Two tests are conducted: one for the CDC and one for the DCC. Data are collected for use during post-test analysis on a SAR tape. The data collected during the Host Baseline Recorded Live Radar Test are used as comparison data against the outputs resulting from this test. In addition, the PVD presentations are monitored to ensure that correct outputs are displayed. Any non-compares between the Host Baseline data and

PAMRI test data are fully documented and explained. The specific explanation and proof provided must be approved by the Government prior to having the test considered satisfactory. Moreover, the test is run again, if deemed necessary by the Government, to verify proper functional operation.[41]

82.1.4.1 System Interface.

82.1.4.1.1 HCS Interface. The PAMRI provides a channel controlled functional interface between the HCS processor and the PAMRI using either a byte-multiplexer channel or a block-multiplexer channel, as selected by the contractor.[42]

82.1.4.1.2 Peripheral Device Interface. The PAMRI provides a peripheral control function consisting of GPI, GPO, INTI, INTO, and radar interfaces.

a. The radar interface provides for the transfer of radar data from the DRE modems to the PAMRI control function, EDARC subsystem, SMMC subsystem, and the DCU/RAPPI.

b. In addition, for testing purposes at the ACT, the PAMRI provides for the transfer of simulation data between the Looped Sim Driver program cycling on one HCS processor, and a NAS operational program cycling on another HCS processor.[43]

82.1.4.1.3 Transition Switches. All transition switches will be tested for compliance with the transition plan.

82.1.5 FAA Verification.

82.1.5.1 Development Test and Evaluation (DT&E). The Advanced Automation System Branch, ACN-130 has prime responsibility for DT&E testing.

82.1.5.1.1 Definition of DT&E.[44] DT&E is that T&E conducted primarily to assist the engineering design and development process by determining incrementally the degree to which functional engineering specifications are attained. DT&E includes T&E of systems, subsystems, units, hardware, software, full-scale engineering models and prototypes. DT&E includes functional T&E of unit, subsystem, and system integration; testing functional integration of hardware with software and the operational program; and testing functional compatibility and integration with operational systems onsites and with the NAS.

82.1.5.1.2 Objectives of DT&E.[45] DT&E objectives include:

a. Identification of deficiencies in functional specifications.

b. Demonstrations that the system has been functionally integrated internally and externally.

c. Demonstration that support items such as simulators, logistics, support equipment, and manuals are technically compatible and according to specifications.

d. Determination of safety.

e. An assessment of system technical reliability.

f. Provision of technical data to support environmental impact statements when necessary.

g. Accumulation and provision of data required to support analysis used to estimate the logistics supportability of the system.

h. Provision of data about the compatibility and integration of the new system/equipment.

i. Provision of data for refining estimates of requirements for training programs and training equipment.

j. Provision of information to support development of production specifications.

The contractor develops and conducts the test and evaluation program at ACT in accordance with FAA-approved test plans and procedures. FAA witnesses monitor all DT&E formal testing and participate in test data analysis. Decisions relative to retest and regression testing are made by the FAA based on findings during formal test conduct, data analysis, or software modifications made during the course of testing. DT&E is conducted prior to acceptance of the PAMRI from the contractor.

82.1.5.2 Operational Test and Evaluation. The Implementation Branch, AAP-240, has the primary responsibility for OT&E at ACT.

82.1.5.2.1 Definition of OT&E.[46] OT&E is conducted to:

a. Estimate and/or determine a system's operational effectiveness and operational suitability to be part of the NAS.

b. Identify needed modifications.

c. Provide information on policy, organization, personnel and other operational requirements.

Programs are structured so that OT&E begins early and makes maximum use of DT&E testing. OT&E is conducted from a different perspective than DT&E and FAT&E, and therefore requires the participation of the operations and maintenance organizations to validate that operational requirements are met. OT&E requires operational realism in the test environment, in test objectives, in system boundaries and interfaces, in system operation and in test conduct. OT&E focuses on resolution of critical operational issues and is conducted in phases, each keyed to an appropriate decision point.

82.1.5.2.2 Objectives of OT&E.[47] Specific objectives of OT&E are to:

a. Explore and develop operational procedures.

b. Test the operational integration of a system with the NAS.

c. Predict the operational reliability, maintainability and availability (RMA) of a fully integrated system.

d. Provide reliable estimates of what the system performance will be during operation and what that performance will contribute to the operation of the NAS.

e. Identify operational deficiencies.

f. Evaluate the desirability of recommended changes and tradeoffs to an operational configuration.

g. Evaluate and compare the expected operational performance of a fully integrated system to the operational performance requirements.

h. Provide data for use in developing and refining training and logistics concepts and programs, in supporting and updating user manuals and other publications, and in supporting and updating software.

i. Provide information to permit refinement of program Operation and Maintenance (O&M) cost estimates, and identification of system operational characteristics or deficiencies that significantly impact O&M costs.

82.1.5.2.3 OT&E Implementation. OT&E starts after DT&E has been completed and the FAA has accepted the PAMRI. Teams of ACT, AAC, FAA headquarters, field site, and contractor personnel develop the OT&E test plans and procedures. A small core of AT and AF personnel will be detailed to ACT to support the development and tests. Fig. 82-2 shows the timing and estimated personnel requirements.
The formal OT&E planned and executed by the Government occurs at ACT prior to the deployment decision for the first site.

AAS SEGMENT	DATE	ASSIGNMENT TO ACT TASKS	PERSONNEL		
			AT	AF	DURATION
PAMRI	5/90	TEST PLAN DEVELOPMENT		1	90 DAYS
	8/90	TEST PROCEDURE DEVELOPMENT		1	90 DAYS
	11/90	TEST PROCEDURE DEVELOPMENT	1	1	90 DAYS
	1/91	FORMAL TESTING	1	1	90 DAYS

FAA Field Personnel Support Requirements for OT&E
Fig. 82-2

83. SITE VERIFICATION.

83.1 Site Organizational Roles and Responsibilities. The PAMRI is basically "back room" hardware and software. As such, AF has the primary responsibility for acceptance of the PAMRI; however, due to potential operational impact, AT will share acceptance responsibility with AF.

a. AT must be involved during transition since all input/output data are switched one channel at a time or globally between the PAM and PAMRI. The switching has a potential for adverse ATC impacts but procedures and

redundancy should minimize or eliminate the impact.

b. AT must also be involved to ensure that the operation of the PAMRI does not have any detrimental effect on air traffic operations and can serve as the primary system. AT personnel along with AF personnel support PAMRI testing at ACT. (See paragraph 82.1.5.2.3.)

c. Field site testing and the roles of each organization will be refined during the testing at ACT.

d. The FAA and contractor develop site test plans in accordance with the contract.[48]

83.1.1 Site Support.

83.1.1.1 ASM-400 Site Program Bulletin. The National Automation Engineering Field Support Division, ASM-400, provides for the national release of portions of software system used for ATC and the support of ATC systems. ASM-400 tests and assembles these software systems for release under a series of site program bulletins signed by the manager of the National Automation Engineering Field Support Sector, ASM-400. This task includes:

a. Testing the software systems delivered by the AAS contractor.

b. Verifying software documentation delivered by the AAS contractor.

c. Providing field support for software problems.

83.1.1.2 FAA Technical Center (ACN-130) Site Support. The FAA Technical Center, ACN-130, makes available two support personnel to each site through FAA acceptance of the PAMRI at the site. After completion of site acceptance testing, if requested, ACN-130 provides support in the conduct of site operational integration tests leading to IOC. ACN-130 also supports the site in the conduct and analysis of failure mode testing and system shakedown tests which culminates in the ORD. The level of support is determined by the efforts needed to ready the PAMRI for operational use. Requests for support must be made through the Engineering Test and Evaluation Service, ACN-100. Requests are granted on a priority basis due to the limited number of personnel available.

83.1.1.3 ATR-250 Site Program Bulletin. The National En Route Field Support/Maintenance Branch, ATR-250, provides for the national release of operational ATC software. ATR-250 tests and assembles the operational software package for release under a series of site program bulletins signed by the manager of the National En Route Field Support/Maintenance Branch, ATR-250. This task includes:

a. Testing the software systems delivered by the AAS contractor.

b. Verifying software documentation delivered by the AAS contractor.

c. Providing field support for software problems.

83.1.1.4 Remote Facility Site Support. All remote facilities that have a data interface with the PAM's and DRG's will have involvement during the PAMRI installation and testing. The involvement will be needed for site verification, etc. This will require AT and AF personnel at some facilities and AF personnel at the radar sites. Every effort will be made to schedule testing and cutover during normal remote facility operational hours. AT/AF ARTCC PAMRI management personnel will be responsible for developing schedules and coordinating with appropriate remote facility personnel.

83.2 Site Verification. There are 10 major areas of site verification. Figure 83-1 shows the major areas.

83.2.1 Installation and Checkout.

83.2.1.1 Hardware Installation.[49] PAMRI installation and checkout, which is approximately a one-week activity, involves the following hardware units:

a. Adapter Unit (AU). Four AU racks and two Maintenance Consoles (IBM PS/2's) will replace the PAM's and IBM 4805 CCR translator. Two AU's are required to be active to provide access to all devices, while the other AU's provide the required redundancy. Each pair of AU's is supported by a PS/2 with attached printer. All PS/2's and printers will be table mounted within 18 feet of the AU's or RDDU's.

PAR #	TITLE	MAJOR FEATURE
83.2.1	Installation and Checkout	Contractor verifies proper equipment installation
83.2.2	Hardware Integration and Testing	Contractor verifies proper intra and inter connection of PAMRI equipment
83.2.3	System Tests	Ensures total PAMRI functions correctly
83.2.4	Transition Tests	Ensures transition equipment and procedures are working
83.2.5	Acceptance Tests	Test system to IOC
83.2.6	Contractor Acceptance Inspection (CAI)	PAMRI meets contractual requirements FAA accepts PAMRI from contractor
83.2.7	FAA Integration Testing	FAA shows PAMRI meets operational interfacing requirements
83.2.8	Certification	FAA shows PAMRI provides accurate data according to cert. procedures
83.2.9	Initial Operating Condition	FAA audit shows all requirements for operational use are in place
83.2.10	Operational Shakedown and Changeover	Operational use shows PAMRI is ready to replace PAM
83.2.11	Post ORD Changeover	Removal of Transition Equip.-IBM Removal of Obsoleted Equip.-FAA
83.2.12	Joint Acceptance Inspection (JAI)	Formal FAA audit of PAMRI shows PAMRI properly and completely implemented

Site Verification Matrix
Fig. 83-1

b. Radar Data Distribution Unit (RDDU). A single RDDU rack, plus its Maintenance Console (IBM PS/2), replace the current DRG equipment, the current DCU, and the EDARC RMUX. These units may be located independently from the AU's, as required. In addition, there will be a printer for the PS/2.

c. Modem Splitter (MS). The Modem Splitters provide the means to connect incoming data from either a radar or communication modem to the AU's, the RDDU, and during the transition period, the DRG's and PAM's. Each PAMRI has two Modem Splitter racks.

83.2.1.2 **Hardware Checkout**. Checkout consists of placing each of the PAMRI racks and transition equipment in proper location, and performing stand-alone tests where applicable. Maintenance consoles attached to the AU's and the RDDU are used to run internal diagnostics; checkout is deemed complete with the successful running of these diagnostics. The Modem Splitters are re-drivers and logic level matching devices with no other logic and do not need internal diagnostics.

a. The transition equipment consists of IBM 3814's which switch between the PAM and AU on the HCS side, and T-Bar switches, which switch between the PAM and AU on the device side. Both the 3814's and T-Bar switches are self-tested.

b. The transition switch configuration is illustrated in figure 73-5. The block labeled S-2 represents three IBM 3814 switches, and the block labeled S-3 represents up to eight T-Bar switch configurations. The T-Bar configurations vary by facility and are dependent upon the quantity and type of peripheral devices making up the NAS hardware configuration. The T-Bar switches are physically installed adjacent or close to the device control units (e.g., NRKM, CTS, printers, etc.) being switched.

c. Site specific T-Bar configuration data is to be detailed in the Site Activation Plan, CDRL AT01.

83.2.1.3 **Electromagnetic Radiation Tests**. Tests are conducted to verify that the emission and susceptibility requirement of SLS 3.3.2 are met. These tests take place prior to the connection of the PAMRI equipment to GFE. The tests are performed using an Electro Static Discharge Test Set.

83.2.1.4 **FAA Responsibility for Installation and Checkout**. The FAA performs the following:

a. Monitor contractor installation and testing performance.

b. Coordinate all actions that impact ARTCC operation with appropriate organization in a timely manner.

c. Record all data that is appropriate for follow up contractor action.

d. Record all data that are required for CAI and JAI completion.

83.2.2 Hardware Integration and Testing.[50] Hardware integration consists of systematically and incrementally interconnecting the "T-Bar" switches into the existing GFE network of NAS subsystems, on a non-interfering basis. This will be accomplished by coordinating with ATC management, AT and AF first, to determine when a subsystem may be released from ATC use. Once equipment is released it is baseline tested, interconnected with the transition switch, and re-tested. The FAA re-certifies the equipment, and places it back into service with the transition switch in place. All testing is accomplished using existing GFE diagnostic and test software, and with newly-delivered modified GFE diagnostic and test software. Integration of the IBM 3814 transition switch between the HCS and the PAM's/AU's, and integration of the Modem Splitters into the radar and interfacility input string (DRG's and PAM's), is accomplished in a similar manner. This activity requires the coordination and support of AF and AT personnel. Details of this process are to be provided in the Site Activation Plan, CDRL AT01, for each facility. A high level description follows:

83.3.2.2.1 Modem Splitter Integration. The Modem Splitters are transitioned separately from the rest of the PAMRI equipment, certified, and used in ATC prior to the other PAMRI equipment. The modem splitters are transitioned incrementally, one channel at a time, as follows:

a. A baseline test of radar certification is executed.

b. A single radar modem channel is connected.

c. Radar certification is rerun to determine that there has been no degradation of the radar channels.

d. Additional radar channels are attached one at a time. After each additional channel is added, a recertification is run.

The INTI/INTO modem splitters are transitioned as part of the AU transition.

83.2.2.2 Transition Switch Integration. The incremental approach used in the modem splitter integration is followed, thus ensuring that all existing functions are maintained until completion. The following steps are used to integrate the PAMRI hardware into the existing system.

a. A baseline test is executed to test the HCS, PAM, all PAM I/O adapters, and peripheral devices using existing GFE diagnostic and test software.

b. The 3814 Channel Interface Switches are installed between the PAM's and the HCS, and activated until the AU's are integrated.

c. PAM adaptor and device baseline tests are rerun using existing GFE diagnostic and test software.

d. T-Bar switches and modem splitters on the INTI/INTO channels are integrated between the PAM's and the devices, and activated until the AU's are integrated.

e. The baseline tests are rerun, and the results compared using existing GFE diagnostic and test software.

83.2.2.3 Integration of the AU's. The preceding steps integrate the transition hardware into the system. The following steps are used for AU integration:

a. The AU's are connected to the IBM 3814's.

b. Modified MDM software is introduced, to be used in the testing of the AU adaptors.

c. The standby Host is switched to the AU via the IBM 3814 switch (the AU's do not have devices attached).

d. Diagnostics are run on the AU adaptors to create a baseline for the AU's (correct results for these tests are known and validated at ACT during DT&E).

e. AU connection to the T-Bar switches is completed on a subsystem-by-subsystem basis, with each subsystem allocated to a single test period (this activity is spread over several days).

(1) Connect the subject device (subsystem) to the AU via the T-Bar switch, completing the path from the HCS to the I/O device.

(2) Pam adapter checkout DCC51 and D7xxx device interface tests shall be run.

(3) Compare the device to the two baselines; the AU tests to its baseline, and the device tests to results obtained through the PAM's tests. Cabling connecting the PAMRI and the T-Bar switches is shown in figure 73-5. The cabling methodology permits easy removal of the transition equipment. When the transition switches, PAM's, and associated cabling are removed, the cables that remain connect directly to the respective devices without any adjustment to the connector.

83.2.2.4 Integration of the RDDU. Following the integration of AU's with the peripheral devices and the HCS, the RDDU is integrated with the modem splitters, EDARC, and the Enhanced Systems Maintenace Monitor Console (ESMMC) in order. Integration of each succeeding piece of equipment is begun after confidence with the equipment integrated is achieved. The following steps are used:

a. Outputs from the modem splitters, for each of the radar interfaces, are interconnected with the RDDU.

b. Resultant radar data is presented and verified on the RDDU Maintenance Console RAPPI display function. This interconnection is in parallel with modem splitter outputs, which have been previously interconnected with both the DRG's and the AU's.

c. The EDARC is released from AT as a backup to NAS for the duration of these tests; all ATC operations are conducted using the primary and standby Host processors.

d. An EDARC baseline test is executed with the current EDARC/RMUX/DRG configuration to provide a basis for the RDDU/EDARC integration; results of this test are recorded for comparison with the integration tests.

e. The two RDDU RMUX outputs from the RDDU are interconnected with the EDARC Display Processors via the EDARC Simulation Switch (the RDDU input cables connector is swapped with the simulator input cables on the rear of the switch).

f. The simulator switch is thrown, the EDARC baseline tests are rerun (with inputs from the RDDU), and the results compared with the baseline configuration tests.

g. Once the results have been verified, the simulation switch is thrown back into the RMUX position, re-certified by the FAA and EDARC is returned to service.

h. The RDDU interface with the ESMMC RAPPI, DRG Interface (DI), and Remote Facility Module (RFM) and are transitioned incrementally. One radar site at a time is connected and correct operation is visually verified as detailed in the PAMRI test plan and procedure CDRL's TE35 Volume III and TE36 Volume VI respectively. Once the results have been verified, the RDDU interface with the ESMMC will be disconnected and the DI will be reconnected. The DRG/ESMMC/RDDU interfaces will remain in this state until FAA Integration and Test.

83.2.2.5 System Tests (Software Integration). The NAS software is modified during software development to accommodate the new AU's. This modified software is integrated at ACT, along with the site-unique local patches and adaptation data. The new software package is subjected to rigorous testing at

ACT. After the FAA is satisfied the package is properly integrated, the software is transferred to the particular site for further integration and system testing. This activity includes integration of the NAS operational software with the newly-delivered AU hardware. The EDARC operational software is also integrated with the newly-delivered RDDU hardware. Each system (hardware and software) is tested in accordance with the plans and procedures defined in CDRL's TE35 and TE36.

83.2.2.5.1 FAA Responsibilities. The FAA performs the following tasks:

a. All tasks contained in paragraph 83.2.1.4.

b. Authorize the connection of the PAMRI equipment to NAS.

c. Monitor and maintain the status and results of each test.

d. Ensure that tests that fail are analyzed, the problem fixed and the test completed or documented for further action.

83.2.3 System Tests.[51] Site system tests are conducted at each operational ARTCC. The purpose of these tests is to ensure that the total PAMRI, including hardware, software, and firmware, functions correctly and that it is fully compatible and properly interfaced with the other systems and facilities. The tests are conducted using the tests similar to ACT system tests, but with the adaptation of the operational ARTCC. A Software/Site Adaptation Test is conducted to ensure that site adaptation data unique to each ARTCC has been correctly installed for the PAMRI. Figure 83-2 shows the Site System Tests.

TEST	PARA.
a. Host Base Line Test	82.1.3.1
b. Host Operational Monitor Test	82.1.3.2
c. Functional Test	82.1.3.3
d. Failure/Recovery/Reconfiguration	82.1.3.4
e. Capacity and Response Time Test	82.1.3.5
f. On-line Certification Test	82.1.3.6
g. Failure Mode Test	82.1.3.7
h. Maintenance Test	82.1.3.8
i. EDARC Tests	82.1.3.9

System Tests
Fig. 83-2

83.2.3.1 FAA Responsibility. See paragraphs 83.2.1.4 and 83.2.2.5.1 as appropriate.

83.2.4 Transition Tests.[52] Following the integration of the NAS software with the PAMRI elements, a series of transition tests will be performed to ensure the NAS system can transition between the existing PAM configuration and the PAMRI configuration. The transition tests to be conducted include the following:

a. Switchforward. Switchforward is the process of switching NAS operations from the current PAM configuration to the new PAMRI configuration.

b. Switchback. Switchback the reverse of switchforward; it is the scheduled switching of operations back to the present configuration.

c. Contingency Plans. Contingency plans address problems in the switchforward/switchback process itself.

d. Fallback. Fallback is an unscheduled switchback from PAMRI to PAM.

The switchforward from PAM to the PAMRI AU's and RDDU's will occur as two separate switchforward and switchback operations. This allows the PAM to PAMRI AU's to be transitioned while the present EDARC system using the DRG and RMUX will be available for ATC operations. After the last switchforward to the PAMRI AU's takes place, the transition to the PAMRI RDDU's can start. This is only a suggested approach. It is also possible to alternate the transitions. In any case, by making the transitions separate, ATC can be performed with either the PAM/Host or the present EDARC. This allows one of the two present systems to be used while one of the new PAMRI functions is being transitioned. These transition processes are tested and demonstrated during ACT testing and the Integration and Test period, prior to IOC.

83.2.4.1 AU Transition Procedure. The AU transition tests include the following operational changeover steps:

a. Switchforward.

b. Switchback.

c. Contingency and recovery.

d. Fallback.

83.2.4.1.1 PAM to PAMRI AU's Switchforward. Switchforward from the PAM's to the PAMRI AU's will occur by transitioning the system through a five state scenario as shown in figure 83-3. Equipment

state changes directed by the systems engineer will have been fully coordinated with ATC management immediately prior to being made. The scenario is explained as follows:

a. Switchforward State 0. State 0 is the initial operating state for the present system with the transition switches in the data flow paths. The system is operating as follows:

(1) All ATC functions are being performed by Host A with EDARC as backup for ATC.

(2) All peripheral devices are communicating with Host A through the PAM.

(3) PAMRI interfaces are unused with the exception of the modem splitters which are providing radar data to the DRG.

(4) Host B is in a standby state ready to take over from Host A.

b. Switchforward State 1. All conditions remain the same as in State 0 except:

(1) The systems engineer coordinates with the Air Traffic Manager In Charge (AMIC) for a planned shutdown of the Host A NAS operational system.

(2) The system engineer requests that all controllers switch their displays to an EDARC display. ATC is now being performed by EDARC with no Flight Plan Data output available.

(3) The systems engineer communicates to the computer operator to take Host B

TIME INTO TRANSITION MIN:SEC	00:00	22:00	52:00	58:00	60:00	
INTERVAL TIME		22:00	30:00	06:00	02:00	
STATE	0	1	2	3	4	5
EQUIPMENT/SUBSYSTEM						
PAMRI (RDDU's)	OUTPUTS NOT USED →	→	→	→	→	→
PAMRI (AU's)	OUTPUTS NOT USED →	→	SWITCH TO HOST B	→	→	→
HOST B	BACKUP TO HOST A	LOAD NASM SOFTWARE	READY	MANUAL FP ENTRY	ATC OPERATIONS →	→
ALL PERIPHERALS AND ARTCC/ARTS	TO PAM →	→	SWITCH TO PAMRI →	→	→	→
HOST A	ATC OPERATIONS	PLANNED SHUTDOWN	READY →	→	LOAD NASM SOFTWARE	BACKUP TO HOST B
EDARC	BACKUP TO HOST A	ATC NO FDP →	→	→	BACKUP →	→
ATC OPERATIONS	HOST A (PAM)	EDARC NO FDP →	→	→	HOST B (PAMRI) →	→
STATE	0	1	2	3	4	5

Legend:

□ = Encloses Equipment/Subsystem using PAMRI and/or Running on NASM Software

PAM to PAMRI AU Switchforward Matrix
Fig. 83-3

offline and to load the NAS Modifications for PAMRI (NASM) software which is the NAS software that has been updated with the PAMRI changes.

c. Switchforward State 2. In this state, the following events occur:

(1) Host A goes to standby.

(2) All peripheral devices are switched to PAMRI via "T-Bar" switches.

(3) Host B is set to ready.

(4) Certify system.

d. Switchforward State 3. In this state, the following events occur:

(1) The systems engineer types in the command to switch PAMRI to Host B.

(2) Flight Plan Data is entered by hand.

e. Switchforward State 4. In this state, the following events occur:

(1) The systems engineer requests that all positions switch from EDARC back to the primary channel.

(2) ATC is now supported by Host B.

(3) EDARC assumes the backup role to Host B.

(4) The systems engineer communicates to the computer operator to take Host A offline and to load the NASM software on Host A.

f. Switchforward State 5. In this state, the following event occurs:

(1) Host A becomes backup to Host B.

83.2.4.1.2 PAM to PAMRI AU Switchback. The switchback will occur by transitioning through a five state scenario as shown in figure 83-4.

a. Switchback State 0. State 0 is the normal operating configuration for the NASM system. In this state ATC operations are as follows:

(1) PAMRI AU outputs are going to Host B.

(2) ATC operations are being conducted on Host B.

(3) Host A and EDARC are backing up Host B.

b. Switchback State 1. In this state, the following event occurs:

(1) The systems engineer communicates to the computer operator to take HOST A offline and to load the NAS on Host A.

(2) The system engineer requests that all controllers switch their displays to an EDARC display. ATC is now being performed with EDARC with no Flight Plan (FPD) output available.

(3) Host A and EDARC are backing up Host B.

c. Switchback State 2. In this state, the following events occur:

(1) Host A is set to ready.

(2) Host B is set to standby.

(3) The system engineer types in the command to switch the "T-Bar" switches so all peripheral devices are attached to Host A through the PAM's.

(4) Certify system.

d. Switchback State 3. In this state, the following events occur:

(1) ATC operations are supported by EDARC with no FDP.

(2) Flight plans are manually entered.

(3) Device inputs are through the PAM.

(4) EDARC becomes backup to Host A for ATC operations.

e. Switchback State 4.

In this state, the following events occur:

(1) ATC operations are supported by HOST A.

(2) The systems engineer communicates to the computer operator to take Host B offline and to load the NAS on Host B.

f. Switchback State 5. In this state, Host B becomes backup to Host A for ATC operations.

83.2.4.1.3 **PAM to PAMRI AU's Contingency and Recovery Plans.** During transition from PAM to PAMRI AU's and vice versa, problems may occur that would disrupt the switchover process. These problems can be partitioned into two categories:

a. PAMRI AU problems.

b. PAM problems.

The transition manager will have the option of stopping the switchover if he has doubts about the readiness of any system (DRG, PAMRI, RDDU, or PAMRI MODEM SPLITTER) involved. The contingency plan shown in figure 83-5 describes the recovery procedure at each state of the switchover. The table gives the action that should be taken if either of the two types of problems occur during one of the states of switchforward or switchback.

TRANSITION TIME (MIN:SEC)	00:00	22:00	52:00	58:00	60:00	
INTERVAL TIME		22:00	30:00	06:00	02:00	
STATE	0	1	2	3	4	5
EQUIPMENT/SUBSYSTEM						
PAMRI (RDDU's)	OFF					
PAMRI (AU's)	OUTPUTS TO HOST B →	→	→	→	→	STANDBY
HOST B	ATC OPERATIONS	PLANNED SHUTDOWN	STANDBY	→	LOAD NAS SOFTWARE	BACKUP TO HOST A
ALL PERIPHERALS AND ARTCC/ARTS	TO PAMRI →	→	SWITCH TO PAM	→	→	→
HOST A	PRIMARY BACKUP	LOAD NAS SOFTWARE	READY	MANUAL FP ENTRY	ATC OPERATIONS →	→
EDARC	SECONDARY BACKUP	ATC NO FDP →	→	→	BACKUP TO HOST A →	→
ATC OPERATIONS	HOST B (PAMRI)	EDARC NO FDP →	→	→	HOST A (PAM) →	→
STATE	0	1	2	3	4	5

Legend:

= Encloses Equipment/Subsystem using PAMRI and/or Running on NASM Software

PAM to PAMRI AU Switchback Matrix
Fig. 83-4

PAMRI EQUIPMENT	IF A FAULT OCCURS	SWITCHFORWARD ST				SWITCHBACK ST			
		1	2	3	4	1	2	3	4
PAMRI	Decision	S	S	C	C	S	C	C	C
	Action	1	1	2	2	1	2	2	2
PAM	Decision	S	C	C	C	S	S	C	C
	Action	3	2	2	2	1	1	3	3

NOTES:
DECISION CODES:
S - STOP
C - CONTINUE

ACTION CODES:
1 - REPAIR, RETEST, AND RESTART TRANSITION
2 - REPAIR, RETEST, AND CONTINUE TRANSITION
3 - SWITCH TO ALTERNATE HOST PROCESSOR
- REPAIR, RETEST, AND RESTART TRANSITION

PAM to PAMRI AUs Contingency and Recovery Plans
Fig. 83-5

83.2.4.1.4 **PAM to PAMRI AU's Fallback Plan.** Fallback from PAMRI AU's to PAM is accomplished by first switching the system to EDARC and reloading the unmodified NAS. The T-Bar switches are switched to enable the GPI/GPO and INTI/INTO outputs to the PAM. Next, the 3814 is switched from PAMRI outputs to Host to PAM outputs to Host at the NAS manager's position. After the system is initialized, ATC commences on the PVD's using the Host system.

83.2.4.2 **RDDU Transition Procedure.** Transition from operations using the DRG/RMUX radar outputs to operations using PAMRI RDDU's include the following operational changeover steps:

a. Switchforward (going from the DRG/RMUX to the PAMRI RDDU's).

b. Switchback (going back to the DRG/RMUX from the PAMRI RDDU's).

c. Contingency and recovery (what to do if a failure occurs during the switchforward or switchback).

d. Fallback (if desired, how to go from the PAMRI RDDU's to the DRG/RMUX configuration without going through the step-by-step switchback procedure).

83.2.4.2.1 **DRG/RMUX to PAMRI RDDU's Switchforward.** Switchforward will occur by transitioning the system through a five state scenario as shown in figure 83-6. Equipment state changes directed by the systems engineer will have been fully coordinated with ATC management immediately prior to being made. The scenario is explained as follows:

a. Switchforward State 0. State 0 is the operating state for the system with the transition switches and the PAMRI AU's in the data flow paths. The system is operating as follows:

(1) All ATC functions are being performed by Host A with EDARC as backup for ATC.

(2) All peripheral devices, interfacility data and radars are communicating with Host A through the PAMRI AU's.

(3) Host B is in a standby state ready to take over from Host A.

(4) EDARC is in a secondary backup state.

(5) Connect the RDDU EDARC output to the simulator input on the EDARC Display Processor (DP) cabinet.

b. Switchforward State 1. All conditions remain the same as in state 0 except:

(1) The systems engineer communicates to AF personnel to switch the EDARC DP cabinet switch to the simulation position. (The RDDU EDARC output is connected to this input. See State 0.)

(2) Certify the EDARC channel.

c. Switchforward State 2. In this state, the EDARC again becomes the secondary backup.

d. Switchforward State 3. In this state, the following events occur:

(1) Disconnect DRG from ESMMC and connect RDDU outputs.

(2) Certify ESMMC.

e. Switchforward State 4. With the exception of the transition switches, this is the final configuration of the system that will exist after ORD. In this state, the ESMMC becomes operational.

83.2.4.2.2 **DRG/RMUX to PAMRI RDDU's Switchback**. Switchback will occur by transitioning the system through a five state scenario as shown in figure 83-7. Equipment state changes directed by the systems engineer will have been fully coordinated with ATC management immediately prior to being made. The scenario is explained as follows:

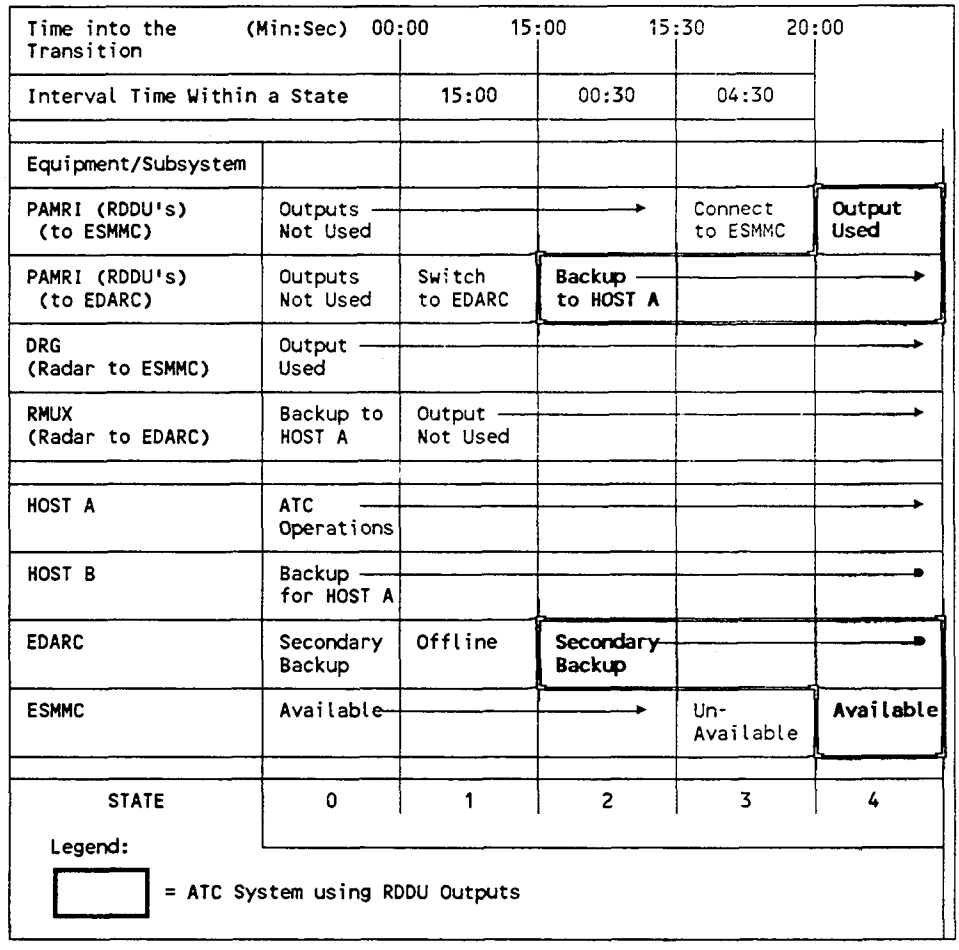
a. Switchback State 0. State 0 is the operating state for the system with the transition switches and the PAMRI AU's and RDDU's in the data flow paths. The system is operating as follows:

(1) All ATC functions are being performed by Host A with EDARC as backup for ATC.

(2) All peripheral devices, interfacility data and radars are communicating with Host A through the PAMRI AU's.

(3) Host B is in a standby state ready to take over from Host A.

(4) EDARC is in a secondary backup state. (RDDU is providing radar data.)



DRG/RMUX to PAMRI RDDU's Switchforward
Fig. 83-6

b. Switchback State 1. All conditions remain the same as in state 0 except:

(1) The systems engineer communicates to AF personnel to switch the EDARC DP cabinet switch from the simulation position to the normal position input. (The RMUX radar output is connected to this input.)

(2) Certify the EDARC channel.

c. Switchback State 2. In this state, the EDARC again becomes the secondary backup.

d. Switchback State 3. In this state, the following events occur:

(1) Disconnect RDDU from ESMMC and connect DRG outputs.

(2) Certify ESMMC.

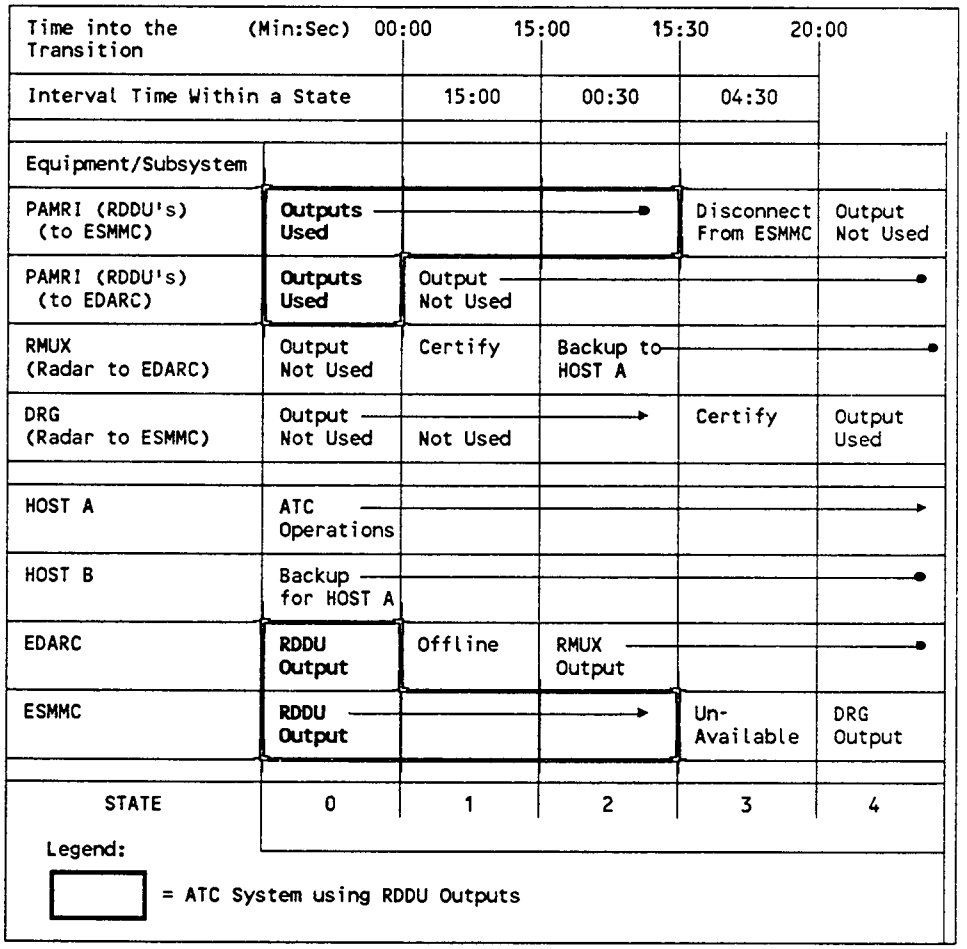
e. Switchback State 4. In this state, the ESMMC becomes part of the system using radar data from the DRG.

83.2.4.2.3 **DRG/RMUX to PAMRI RDDU's Contingency and Recovery**. During transition from DRG to PAMRI RDDU and vice versa, problems may occur that would disrupt the switchover process. These problems can be partitioned into two categories:

a. PAMRI Radar RDDU to EDARC.

b. PAMRI Radar RDDU to ESMMC.

The transition manager will have the option of stopping the switchover if he/she has doubts about the



DRG/RMUX to PAMRI RDDU's Switchback
Fig. 83-7

readiness of any system (DRG, RMUX, PAMRI, RDDU, or PAMRI MODEM SPLITTER) involved. The contingency plan shown in figure 83-8 describes the recovery procedure at each state of the switchover. The figure gives the action that should be taken should either of the two types of problems occur during one of the states of switchforward or switchback.

PAMRI EQUIPMENT	IF A FAULT OCCURS	SWITCHFORWARD ST				SWITCHBACK ST			
		1	2	3	4	1	2	3	4
RDDU TO EDARC	Decision	S	S	S	C	C	C	C	C
	Action	1	1	1	2	2	2	2	2
RDDU TO ESMMC	Decision	C	C	S	C	C	C	C	C
	Action	2	2	3	2	4	4	4	2

NOTES:
DECISION CODES:
S - STOP
C - CONTINUE

ACTION CODES:
1 - SWITCH EDARC BACK TO REMUX
- REPAIR, RETEST, AND RESTART TRANSITION
2 - REPAIR, RETEST, AND CONTINUE TRANSITION
3 - RECABLE TO DRG
- REPAIR, RETEST, AND RESTART TRANSITION
4 - RECABLE TO DRG
- REPAIR, RETEST, AND CONTINUE TRANSITION

Contingency and Recovery Plans
Fig. 83-8

83.2.4.2.4 DRG/RMUX to PAMRI RDDU's Fallback. Fallback from PAMRI RDDU outputs to the DRG/RMUX radar outputs is accomplished as follows:

a. Switch EDARC DP switch to the "normal" position from the "simulation" position to obtain radar outputs from the RMUX.

b. Certify the EDARC system.

83.2.5 Acceptance Test. A Site Acceptance Test is successfully completed at each operational site prior to the declaration of IOC. This testing verifies that the software that has been modified since the Site System Test (e.g., to reflect updates that make it compatible with current software in operational use, such as adaptation changes, national "patches," new version) functions and performs correctly and is ready for use during IOC. Regression tests and retests are used to satisfy the Site Acceptance Test requirement. The acceptance tests are compared to a subset of site systems and site integration tests. The selection of the components is at the discretion of the FAA. The tests are documented and agreed on prior to start of testing.

83.2.5.1 FAA Responsibilities. Paragraph 83.2.1.4 and 83.2.3 as appropriate.

83.2.6 Contractor Acceptance Inspection. The Implementation Branch, AAP-240, has the primary responsibility for the CAI. The contractor acceptance inspection is the formal acceptance by the agency from the installation contractor of an installed PAMRI. Upon successful completion of CAI a Facilities Master File (FMF) change is implemented by the site personnel to transfer the PAMRI from a preconstruction to a test mode. Equipment element failures of any PAMRI equipment are entered into the National Airspace Performance Reporting System (NAPRS) for failure mode tracking.[53] The CAI at each operational site consists of a Site System Test (SST) and a Site Acceptance Test (SAT).

83.2.7 FAA Integration Testing. The FAA Integration Test task is the process of testing the interfaces of PAMRI with other FAA systems under all operational conditions. Contractor Integration Testing assures that the system meets the requirements defined in the Interface Requirements Documents and Interface Control Documents. FAA integration testing assures that these interfaces work. Test procedures from the ACT integration tests are used by site personnel to determine what does NOT need to be retested at their site, to develop new site specific tests, and to repeat ACT testing as deemed necessary by site personnel. Failure mode testing is required at the first two sites, and is optional at the subsequent sites. Each site is responsible for the content of its FAA Integration Test. Each site considers regression testing of software and hardware corrections as a part of its FAA Integration Test. The contractor is in the support mode during this period.

83.2.7.1 FAA Responsibilities. The task of integration testing includes:

a. Developing detailed test procedures based on ACT Integration Tests.

b. Conducting FAA Integration Tests according to test procedures.

c. Developing test procedures and conducting tests for site peculiar situations.

d. Providing expert phone and onsite assistance as required by sites to site AF personnel concerning:

(1) FAA systems interfaced with the PAMRI.

(2) Problems encountered during testing.

e. Writing a test report that describes the FAA Integration Tests and defines problems encountered.

83.2.8 **Certification.** Technical certification is the periodic verification that the advertised or required quality and scope of service is being provided to the users. The certification of PAMRI is based on PAMRI technician's qualifications in three areas: professional attainment, capacity for independent judgment and responsible action, and qualifications to perform assigned duties as attested by his/her having met the requirements of the technician certification program.[54] The technician certifies the PAMRI by attesting that the critical parameters are within the tolerances or limits prescribed in the maintenance directives and that the advertised service is being provided to air traffic controllers.[55]

a. The AAS contractor identifies all key performance parameters, i.e., critical indicators of whether or not the system is satisfactorily performing its intended function. The contractor provides recommended standards and tolerances and the means to verify satisfactory performance. Maximum use is made of internal, automated equipment, systems and functional verification methods.[56]

b. The PAMRI provides for commands to test the PAMRI hardware and software. The system performs tests to the level required for certification and reports the results to the device requesting the test. The PAMRI implementation task of certification includes:

(1) Establishing certification parameters and limits.

(2) Issuing appropriate certification criteria and technical guidance.[57]

(3) Providing on-line testing and certification.

(4) Providing training for certifiers.

83.2.9 **Initial Operational Capability.** The IOC is that point when the equipment hardware and software installation and testing have been completed and meet defined requirements. IOC is the declaration by AT and AF managers, in concert with responsible FAA headquarters and regional personnel, that the PAMRI (including hardware, software, and personnel) is physically and functionally capable of replacing the current air traffic system during selected (i.e., test) periods of time. The declaration of IOC also serves as a milestone in the JAI of the system. The following are accomplished prior to IOC:

a. The structured phase of AT/AF management workforce training on the PAMRI.

b. Operations and maintenance training for the PAMRI switchforward, switchback, and fall back process prior to operational transition.

c. The structures phase of PAMRI hardware and software maintenance training for maintenance to be performed by the FAA.

d. Evaluations that determine the adequacy and acceptability of procedures.

e. System testing that demonstrates an IOC.

f. Delivery of current FAA accepted final copies of all PAMRI technical documentation.

83.2.10 **Operational Shakedown and Changeover (ORD).**[58] The system shakedown phase begins following IOC, and concludes with ORD. During the system shakedown phase, the FAA will continue with some FAA Integration Test activities. The system will be operated with operational personnel and the current field version software in a live traffic environment for varying periods of time, to gain confidence, and to identify and resolve operational problems prior to the ORD. It is recommended that no more than three switchforwards will be needed for the AU and a single

switchforward for the RDDU, due to the transparency of the new equipment to the ATC operations. (It is likely that as later sites are in the system shakedown mode that a single switchforward will be all that is required for the AU's.) Defining the actual shakedown activities that will be conducted at this time will be the responsibility of the individual facility with support from IBM, the program office, and other field support organizations. These activities at the ARTCC will be directed at verifying that the PAMRI, as installed, can be successfully and continuously operated by the FAA. These activities will be conducted to ensure that site personnel, operational procedures, and the PAMRI as a whole are ready for sustained operations. This phase will culminate in an ORD for the PAMRI.

83.2.11 **Post ORD Changeover.**[59] The Post Operational Changeover phase will commence after ORD and at a time established by the facility FAA management. This phase will consist of removing the following replaced system and transition equipment by the contractor and FAA.

83.2.11.1 **Transition Equipment IBM.** The following lists the PAMRI transition equipment:

a. T-Bar switches.

b. IBM 3814 Transition Switches.

c. A modification, installed on the HCS 3083's to support connection of the IBM 4805's to channels 5 & 6 of each processor.

d. EDARC RMUX to SSC cable (and re-installing the EDARC simulator cable to the simulator switch on the EDARC SSC).

83.2.11.2 **Sequence of Removal.** The sequence of removal actions will be to address the HCS to peripheral device interfaces first, followed by the DRG and RMUX interfaces.

a. Within the HCS to peripheral device string of activities, the T-Bar switches will be disconnected and removed first on a subsystem by subsystem basis, followed by the IBM 3814 switches, followed by the IBM 4805's and the associated RPQ on each processor, followed by the PAM's. Each removal action will be preceded by, and followed by, a baseline test. Baseline tests consist of the execution of the appropriate subsystem diagnostic software, followed by a formal certification of the affected subsystem by the FAA.

b. Following removal, T-Bar transition switches will be replaced and shipped to the next sequential facility on the PAMRI deployment waterfall. Upon completion of the HCS/peripheral device removal activities the DRG output cables will be disconnected from the modem splitter and the two RMUX to EDARC cables will be disconnected from the simulator switch on the EDARC. Again, a baseline test of the EDARC will be performed before and after the simulator cable is reconnected to the EDARC simulator switch, to ensure the integrity of the EDARC. This action will be followed by the re-certification of the EDARC by the FAA.

83.2.11.3 **Obsoleted Equipment FAA.**

a. PAM's.

b. IBM 4805 CCR Signal Translator units.

c. DRG's.

d. The DCU.

e. The EDARC RMUX.

f. All cable, cable ladders, and miscellaneous obsoleted by the PAMRI installation.

g. The floors require repair to replace cut floor tile, etc.

The FAA regions will remove all equipment obsoleted by the PAMRI installation. The removal can be completed using the existing F&E workforce or by contract. Disposition instructions are to be provided by AAP-240 prior to the removal of the equipment.

83.2.12 **Joint Acceptance Inspection.** Before a new or improved facility or electronic equipment system is accepted for maintenance and/or operation as a commissioned facility in, or in support of, the NAS, a

JAI is held on the system/work performed.[60] This is a culmination of a series of activities that includes an investigation and research of records, specific requirements and criteria, as well as the documentation of all inspections, tests, and demonstrations required to assure the FAA that the PAMRI adequately meets all the operational, engineering, and maintenance requirements and is ready to be formally placed into operational use or service. This task is described in the following subparagraphs:

83.2.12.1 **Maintaining a Pre-JAI Punch List.** The Pre-JAI Punch List identifies the discrepancies that are encountered during all testing activities. This list is maintained through CAI. The list includes the resolutions to problems. This list is used as a punch list prior to the start of JAI. The list identifies corrective actions that are to be taken by the contractor before acceptance of the equipment by the FAA.[61]

83.2.12.2 **Organizing the Joint Acceptance Board.** JAI is accomplished by the formation of a board of management personnel who are knowledgeable about the project. The board members have full authority to determine the conditions for acceptance and to sign the JAI Report for their respective offices. The board is composed of the following:[62]

a. Offices responsible for project implementation.

b. Airways Facilities.

c. Air Traffic.

d. Logistics.

e. Region.

83.2.12.3 **Performing an ORD.** The ORD is the formal declaration that the system meets all requirements for full operational use and is ready to become the primary system for ATC. System performance, maintainability, training, spare parts availability, and documentation are among the many items examined during the ORD. A final JAI is conducted at this time by AT/AF managers and other headquarters and regional personnel as required. This task consists of the following:

a. Refining operating procedures, methods, adaptation, and parameters.

b. Demonstrating the adequacy of all aspects of ATC.

c. Verifying that system, subsystem, software, and equipment documentation accurately describe the facts.

d. Verifying that sufficient staffing exists and that personnel are sufficiently trained and familiar with system functions and equipment.

83.2.12.4 **Determining PAMRI Acceptability.** The members of the JAI board determine, within their individual program areas, if facility, system or equipment operation is satisfactory to provide its advertised service. The ultimate determination that the facility is ready to be commissioned for service is dependent upon the technical performance of the electronic equipment, and the attainment of the required operational service. As a part of the JAI, a date for the ORD is determined.[63]

83.2.12.5 **Commissioning.** Commissioning is the formal exercise of incorporating the PAMRI into the NAS. This ultimate determination that the PAMRI is commissioned for service is dependent upon the technical performance of the system and the attainment of the required operational service.[64] The requirements for commissioning the PAMRI are as follows:[65]

a. The joint acceptance board members determine the conditions of acceptability in accordance with established standards and specifications and signed the JAI report for their respective offices.

b. The Facility Reference Data File is established and includes all applicable NCP and CCD technical reference data documentation and reference materials.

c. A change to the FOF is initiated to place the facility in a commissioned status.

83.2.12.6 **Writing the JAI Report.**[66] This report provides a documented basis for acceptance and commissioning of the facility. The report is completed prior to or concurrent with the acceptance and commissioning.

83.2.12.7 **Acceptance of Contract Items.** Acceptance of contract items is made on FAA Form 256, Inspection Report of Material and/or Services. Final

acceptance of all factory point of origin (FOB) contract items are accepted at the factory by the Quality Reliability Officer (QRO). Preliminary acceptance of all FOB destination contract items are at the factory by the QRO. Final acceptance of all FOB destination contract items are at the destination after satisfactory completion of all site testing. Final FAA Form 256 is issued by the QRO or his/her designated representative.

84.-89. **RESERVED.**

CHAPTER 9. INTEGRATED LOGISTIC SUPPORT

90. MAINTENANCE CONCEPT. The Advanced Automation System (AAS) maintenance concept ensure maximum availability of the AAS Air Traffic Control Operational Hardware and Software. Maintenance of the AAS complies with the maintenance philosophy and concept described in Order 6000.27A, Transmittal of Maintenance Philosophy Steering Group (MPSG) Report - 1983 Update; Order 6000.30A, Airway Facilities Service Decisions For The Maintenance Program of the 1980's; and Order 6000.15, General Maintenance Handbook for Airway Facilities.[1] The detailed maintenance concept is provided in appendix D of the National Integrated Logistics Support (NAILS) Plan for the Advanced Automation System. The FAA AAS Integrated Logistics Support Plan is considered as a reference document for the AAS contractor in accomplishing the logistics support functions.[2]

90.1 PAMRI Contractor Requirements. The AAS contractor performs the following Integrated Logistics Support Tasks.[3] The contractor:

a. Supports a joint Government-Contractor NAILSMT. NAILSMT is the primary management vehicle to support the FAA project manager in planning, coordinating, and directing the execution of Integrated Logistics Support Program.[4]

b. Conducts the LSA Program as a single analytical effort with the system engineering process to identify logistic support requirements.[5]

c. Includes as LSA candidates, all items for which the Government does not have an existing documented maintenance capability.[6]

d. Performs an FAA contractor depot level maintenance analysis to determine manpower, skills, tooling, and space required for AAS FAA Depot support.[7]

e. Identifies the manpower and personnel requirements for all levels of hardware and software maintenance, operator positions, including support systems operators at the ACT, and system support for the AAS as part of the LSA process.[8]

f. Plans and completes the tailored tasks required to provision all spare and repair parts to meet the requirements in:

(1) MIL-STD-1388.

(2) FAA-STD-034.

(3) MIL-STD-1561.

90.2 Hardware Maintenance Design. The hardware design is augmented with maintenance features which make support of the PAMRI compatible with the maintenance concept. The maintenance features reduce repair time by providing the technician with the ability to diagnose a malfunction rapidly, identify the failed unit, and replace it quickly.[9]

90.3 Hardware Maintenance.

90.3.1 Periodic Maintenance. Periodic maintenance is defined as all actions performed to maintain the PAMRI in acceptable operational condition including systematic inspection and, where required, calibration. Periodic maintenance activities are not to interfere with normal FAA facility operations. The system/equipment design minimizes the frequency and duration of periodic maintenance tasks. Periodic maintenance task schedules are flexible enough to allow for periodic maintenance to be accomplished in conjunction with corrective maintenance tasks.[10]

90.3.1.1 Corrective Maintenance. Corrective maintenance is defined as all actions performed to restore a failed system/subsystem/LRU to an operational state or functional capability. Corrective maintenance is initiated following notification that equipment is inoperative (off-line), or that degradation of function has occurred, or it has been determined that failure is imminent. Equipment is designed for ease of maintenance by allowing for easy removal and replacement of faulty LRU's with serviceable spares.[11]

90.4 LRU Repair. The contract provides for one year of LRU replacement and total logistic support by the AAS contractor. The option exists for the FAA to renew the contract on a one-year basis for 9 years.

90.5 Software Maintenance. The National Field Support Group (NFSG) analyzes and resolves national and systemwide software problems.[12] The support group located at the FAA Technical Center provides

skills necessary to analyze and correct systemwide problems as well as assist sector support staffs in diagnosing difficult site problems.[13] The NFSG is made up of the National En Route Field/Maintenance Branch, ATR-250; the National Terminal Field Support/Maintenance Branch, ATR-240; and the National Automation Engineering Field Support Sector, ASM-400. The NFSG performs software maintenance in the areas of corrective, preventive, and adaptive maintenance.[14]

90.5.1 **Onsite Software Maintenance.** The PAMRI software maintenance is controlled and supported by the HCS. AT has responsibility for non-diagnostic software that resides in the Host. AF has responsibility for all other software.

90.5.2 **Software Maintenance Staffing.** All facilities are staffed by appropriate numbers of trained automation specialists, supervisors, managers, technicians, and engineers. The staff uses software maintenance tools. These tools build upon the base of tools used in the design, development, and implementation of the delivered software.[15]

90.5.2.1 **First Year.** The contractor provides software maintenance support and engineering services for the PAMRI for the first year. The Government workload estimate is 2 man-years for each function. The contractor provides noncommercial hardware repair, restoration, and supply support for the first year.[16]

90.5.2.2 **Following Years.** The only option that can be exercised for 9 years for PAMRI at field sites is noncommercial hardware repair restoration and supply support.[17]

91. **Training.** The contractor will develop, update, and maintain the PAMRI training program. PAMRI training shall be developed for operations, maintenance, computer operators, and system support personnel. The contractor will develop training curricula for FAA field sites, FAA Technical Center, Aeronautical Center, FAA Academy, and FAA Depot in accordance with FAA-STD-028 and the appropriate AAS contract documentation. The contractor shall plan transition training for FAA personnel to achieve the skill levels to use, operate, maintain, and support the AAS.

a. PAMRI OT&E Training for FAA Technical Center management and monitoring personnel will be delivered using training and engineering support services. Selected formal transition training courseware may be used for training site-level OT&E participants. This training will be conducted at the FAA Academy in December 1990.

b. PAMRI transition training for AF personnel and AT software maintenance personnel will be conducted primarily at the FAA Academy. Courses of short duration may be conducted onsite. Additional planning information may be found in the NAS Training Plan, the NAS Training Data Base, and the forthcoming PAMRI Subsystem Training Plan.

91.1 **Schedules.** The FAA has approved a contractor provided PAMRI Training Plan (TR06). The AAS contract provides for the periodic update of this plan, until the completion of PAMRI transition training. The PAMRI Training Plan contains information on the training overview, implementation, course descriptions, and training materials development. The scheduling of FAA personnel will be provided to the site managers through the FAA quota management system, CPMIS. Early delivery of a PAMRI training system to the FAA Academy in October 1990 provides for an operational tryout of PAMRI training courses in November 1990. A prototype class will be conducted in March 1991. Following the validation of courses and the submission of a Course Report, initial transition training will be conducted at the FAA Academy beginning in April 1991.

91.1.1 **Airway Facilities.** PAMRI training provides the skills to operate the elements, subelements, and subsystems of the PAMRI system. Not more than 25 percent of the AF personnel from a given site shall be in training at any time. Instructor and student guides and performance examinations are provided for individual technical certification. The contractor is developing course materials for the courses shown in figure 91.1.

91.1.2 **Onsite Training.** The contractor is developing the following onsite training courses:

a. PAMRI Proficiency Training courses will be developed for five training categories including: system engineer, staff engineer/technician indepth, AT and AF software specialists, and FAA technician. This training will be conducted onsite and will be available in August 1991.

COURSE TITLE	NUMBER	HOURS (APPROX)
PAMRI System Maintenance Support	49262/43012	120
PAMRI Hardware Maintenance	49263/43013	48
PAMRI Software Maintenance	49028/43014	80
PAMRI System Management	49261/43015	32
PAMRI Overview and Computer Operations	44436	3
PAMRI Technical Center System Support	49264	TBD

Notes:

1. Course 44436 will be included in all PAMRI courses.

2. Technical content and FAA Academy support for Course 49264 is yet to be defined.

Figure 91.1 Academy Training

b. PAMRI On-The-Job Training Courses will be developed for five training categories including: system engineer, staff engineer/technician indepth, AT and AF software specialists, and FAA technician. OJT training objectives emphasizing the performance of specific tasks will be selected, as opposed to presenting the basic concepts. This training will be conducted onsite and will be available in August 1991.

91.1.3 Air Traffic. The PAMRI system is transparent to the air traffic controller functions. Therefore, no air traffic controller training is planned. Air Traffic software maintenance personnel will be trained in site adaptation provisions of PAMRI to the NAS.

92. SUPPORT TOOLS AND TEST EQUIPMENT. The AAS contractor identifies all required support and test equipment, including common and peculiar tools, jigs, fixtures, and material handling equipment required for performing operational and maintenance tasks at all levels.[18] This information is provided to the Government in the LSAR. Software support tools are provided for both onsite and centralized software support.[19] The SAP supplied by the contractor provides a complete list of all special tools and equipment needed to support implementation. The list identifies those items provided by the Government and those items provided by the contractor. Paragraph 58.4 provides a complete description of the SAP.

93. SUPPLY SUPPORT. Supply support includes spare parts, consumables, and associated inventories necessary to support all maintenance actions. The FAA Depot establishes an Initial Supply Support Allowance Chart (ISSAC) to include common and bulk items. Consumables are bulk items such as printer paper, magnetic tape, oil, and grease. These items are purchased in large quantities and stocked by the FAA Depot. Spare parts are initially supplied by IBM.

94. CONTRACTOR DATA AND TECHNICAL MANUALS. The contractor provides all technical data and manuals to each site. The technical manuals are the documents that describe how to install, use, and maintain the PAMRI system and address all levels of users of that system.

a. Contractor-provided Manuals. The contractor provides the following manuals as listed in the SLS:

(1) Installation manuals.

(2) Users manuals.

(3) Computer system operators manuals.

(4) Software program manuals.

(5) Controller manuals.

(6) Supervisor manuals.

(7) Hardware & software technical manuals.

b. CDRL Items. The following CDRL items are of interest to site participants and planners:

AT01 Activation Plan
AT02 Site Preparation Design Information
AT03 Site Readiness Review Report
AT05 Transition Plan
EN50 System Certification Parameters Report
PU01 Computer System Diagnostic Manual
PU02 Computer System Operators Manual
PU11 Software Users Manual
TE35 Test Plan - PAMRI
TE36 Test Procedures - PAMRI
TE37 Test Report - PAMRI

95. EQUIPMENT REMOVAL. See paragraph 83.2.11.

96. FACILITY IMPACT. The impact on ARTCC facilities for the PAMRI installation should be very minor.

97.-99. RESERVED.

CHAPTER 10. ADDITIONAL PROJECT IMPLEMENTATION ASPECTS

100. PAMRI CONFIGURATION MANAGEMENT. Site configuration management of PAMRI will involve controlling changes to the PAMRI functional and physical characteristics and maintaining/reporting status accounting information using the appropriate support system/tool. The configuration of PAMRI will be under the control of the program office until last site acceptance. After acceptance of PAMRI at all sites, the configuration will be controlled by AT and AF organizations. This section addresses PAMRI site CM before and after last site acceptance, both of which are after acceptance at the ACT.

100.1 Site CM before Acceptance at Last Site. Configuration control of PAMRI as it is being deployed to the sites involves coordination of acquisition and maintenance organizations.

100.1.1 Baseline. The PAMRI baseline to be controlled after ACT acceptance is the operational baseline, which is the product baseline, as established after successful completion of the PAMRI Physical Configuration Audit (PCA), and any approved changes required for operational use.

100.1.2 Configuration Control Board (CCB). The AAP-200 CCB continues to be the cognizant CCB for proposed changes to PAMRI until PAMRI has been accepted at the last site. AT and AF user organizations are members of the AAP-200 CCB for decisions on PAMRI changes. Figure 100-1 illustrates the controlling of changes during this period. After PAMRI has been accepted at the last site, changes are processed as indicated in paragraph 100.2.

100.1.3 Change Requests. Applicable change request forms in this period of time are case files (CF) which are processed by the region and prescreened by ATR-200 for changes to operational ATC software and by ASM-400 for changes to hardware/firmware and ASM-400 maintained software. After validation by the prescreening organization, the CF's are submitted to ASE-620 for NCP processing. Changes to specifications identified in the NCP are accomplished via Specification Change Notices (SCN) which are submitted with change pages or change descriptions. After a CF is signed by the initiating organization, the CF data is entered into the national CM status accounting system, Documentation and Identification Control System (DOCCON)--either by the sector/facility or at the regional office. CF and NCP processing is described in Order 1800.8, NAS Configuration Management, and the AAP-200 CM Plan.

100.1.4 Change Implementation. For those sites at which PAMRI has been accepted, the implementing vehicle for software changes are Site Program Bulletins (SPB) distributed by ATR-250 for operational ATC software and by ASM-400 for ASM-400 maintenance software. Hardware and firmware changes are distributed by ASM-400 via Electronic Engineering Modifications (EEM). For the not-yet-accepted PAMRI systems, the implementing vehicle is the contract modification (and procurement request) resulting from the NCP as approved by the AAP-200 CCB.

Product Baseline Element	CCB	ACT & Sites Where Accepted	Factory & Sites Where Not Yet Accepted
Software - ATC Operational	AAP-200	FAA-Initiated: CF->NCP->SPB	FAA-Initiated: CF->NCP->PR->Mod
Firmware/ Hardware	AAP-200	FAA-Initiated: CF->NCP->EEM	FAA-Initiated: CF->NCP->PR->Mod
Software - ASM-400 Maintained Support	AAP-200	FAA-Initiated: CF->NCP->SPB	FAA-Initiated: CF->NCP->PR->Mod

Change Approval/Implementation after ACT Acceptance
Fig. 100-1

100.1.5 Problem Reporting. Software problems continue to be reported using INFO management on the Host's Central Support/Software Development (CS/SD) as PAMRI is accepted at each site. Hardware/firmware problems are reported using hard copy Hardware Discrepancy Report (HDR) forms which are submitted to ASM-400.

100.2 Operational Support Phase CM. Figure 100-2 depicts the controlling of changes to the operational support baseline after PAMRI has been accepted at the last site.

100.2.1 Baseline. The operational baseline, which is the baseline resulting from the product baseline and the changes made to it for operational purposes, is the baseline which is supported/maintained in the operational support phase after PAMRI has been accepted at all sites.

100.2.2 CCB's. The operational support phase CCB's responsible for the PAMRI configuration items are the

AT CCB for ATC operational software and the Maintenance Engineering (ME) CCB for hardware, firmware, and maintenance software.

Baseline Element	CCB	ACT & All Sites
Software - ATC Operational	AT	CF->NCP->SPB
Firmware/ Hardware	ME	CF->NCP->EEM
Software - ASM-400 Maintained Support	ME	CF->NCP->SPB

Change Approval/Implementation after Acceptance at All Sites
Fig. 100-2

100.2.3 **Change Requests**. The change request forms applicable to the operational baseline are CF's/NCP's which are processed by the region and submitted to ATR-200 for prescreening for ATR-250 maintained software and to ASM-400 for prescreening for ASM-400 maintained software and for hardware/ firmware. After a CF is signed by the initiating organization, the CF data is entered into the national CM status accounting system, DOCCON--either by the sector/facility or at the regional office as specified in Order 1800.8.

100.2.4 **Change Implementation**. The implementing vehicle for a change in the operational support phase is an SPB for software and EEM for hardware/firmware.

100.2.5 **Problem Reporting**. After PAMRI, but before ISSS, has been installed at a site, PAMRI software problems are reported using the INFO Management System on the Host's CS/SD and hardware/firmware problems are reported via hard copy HDR form which submitted to ASM-400. After ISSS has been installed and accepted at a site, software problems are reported using INFO Management on the System Support Computer Complex (SSCC).

101.-109. **RESERVED**.

APPENDIX 1. ACRONYMS

AAC	Mike Monroney Aeronautical Center
AAP	Advanced Automation Program
AAPO	Advanced Automation Program Office
AAS	Advanced Automation System
AASPD	Advanced Automation System Participants Documents
ACCC	Area Control Computer Complex
ACT	FAA Technical Center
AF	Airway Facilities
AFTRVT	AF Transition Requirements Verification Team
AMIC	Air Traffic Manager in Charge
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
AT	Air Traffic
ATCT	Air Traffic Control Center
AU	Adapter Units
CAI	Contractor Acceptance Inspection
CCB	Configuration Control Board
CD	Common Digitizer
CDC	Computer Display Channel
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CF	Case File
CI	Configuration Item
CIU	Communications Interface Unit
CM	Configuration Management
CMRS	Calibration/Measurement Requirements Summary
CONUS	Continental United States
COTR	Contracting Officers Technical Representative
CS/SD	Central Support Software Development
CTS	Coded Time Source
DARC	Direct Access Radar Channel
DART	Data Analysis and Reduction Tool
DC	Direct Current
DCC	Display Channel Complex
DI	DRG Interface
DCU	Display Control Unit
DID	Data Item Description
DMUX	Data Multiplexer
DOCCON	Document and Identification Control System
DP	Display Processor
DPU	Display Processor Unit
DR&A	Data Reduction and Analysis
DRE	Data Receiver Equipment
DRG	Data Receiver Group
DRR	Deployment Readiness Review
DT&E	Development Test and Evaluation
EDARC	Enhanced Direct Access Radar Channel
EEM	Electronic Equipment Modification
EIA	Electronics Industries Association

EMI	Electromagnetic Interference
ESMMC	Enhanced System Maintenance Monitoring Console
ESN	Executive Summary Network
EXCOM	Executive Committee
FAT	First Article Test
FAA	Federal Aviation Administration
FDEP	Flight Data Entry and Printout
FDIO	Flight Data Input/Output
FDP	Flight Data Processing
F&E	Facilities and Equipment
FMF	Facility Master File
FOB	Freight Origin Billing
FSQT	Factory System Qualification Test
GFE	Government Furnished Equipment
GFP	Government Furnished Property
GPI	General Purpose Input Adapter
GPO	General Purpose Output Adapter
HCS	Host Computer System
HDR	Hardware Discrepancy Report
HR	Human Relations
ICD	Interface Control Document
I&CO	Installation and CheckOut
ILS	Integrated Logistics Support
ILSP	Integrated Logistic Support Plan
INTI	Interfacility Input
INTO	Interfacility Output
I/O	Input/Output
IOC	Initial Operating Capability
IRD	Interface Requirement Document
ISSAC	Initial Supply Support Allowance Chart
ISSS	Initial Sector Suite System
JAI	Joint Acceptance Inspection
KVDT	Keyboard Video Display Terminal
LRU	Line Replaceable Unit
LSA	Logistics Support Analysis
LSAR	Logistics Support Analysis Record
MAC	Months After Contract
MDM	Maintenance Diagnostic Monitor
ME	Maintenance Engineering
MODEM	Modulator-Demodulator
MPSG	Maintenance Philosophy Steering Group
MSP	Medium Speed Printer
MSS	Master Schedule System
MTP	Master Test Plan
NADIN	National Data Interchange Network
NAILS	National Integrated Logistics Support
NAILSMT	NAILS Management Team

NAPRS	NAS Performance Reporting System
NAS	National Airspace System
NASM	NAS Monitor
NASSRS	NAS System Requirements Specification
NCP	National Change Proposal
NFSG	National Field Support Group
NLT	No Later Than
NRKM	Non Radar Keyboard Multiplexer
NTP	NAS Transition Plan
NVIH	NAS Verification and Implementation Handbook
OLC	On-Line Certification
O&M	Operations and Maintenance
ORD	Operational Readiness Demonstration
OT&E	Operational Test and Evaluation
PA	Project Authorization
PAM	Peripheral Adapter Module
PAMRI	Peripheral Adapter Module Replacement
PAT&E	Production Acceptance Test and Evaluation
PCA	Physical Configuration Unit
PC&B	Personnel Compensations and Benefits
PCB&T	Personnel Compensations, Benefits & Travel
PDU	Power Distribution Unit
PIP	Project Implementation Plan
PMP	Program Master Plan
PVD	Plan View Display
QRO	Quality Reliability Officer
R&D	Research & Development
RAPPI	Random Access Plan Position Indicator
RDAS	Radar Data Acquisition System
RDDU	Radar Data Distribution Unit
RFM	Remote Facility Module
RFP	Request For Proposal
RM&A	Reliability, Maintainability & Availability
RMUX	Radar Multiplexer
SAP	Site Activation Plan
SAR	System Analysis Record
SAT	Site Acceptance Test
SCN	Specification Change Notice
SDR	Looped Sim Drive System
SEI	System Engineering and Integration
SIM	Simulation
SIP	Site Implementation Plan
SLS	System Level Specification
SMMC	Systems Maintenance Monitor Console
SOW	Statement of Work
SPB	Site Program Bulletin
SPDIP	Site Preparation Design Information Package
SRR	Site Readiness Review
SRRR	Site Readiness Review Report
SSCC	System Support Computer Complex

SSG	Software Support Group
SST	Site System Test
TAAS	Terminal Advanced Automation System
T-BAR	Trade Name
TBD	To Be Determined
TCCC	Terminal Control Computer Complex
T&E	Test and Evaluation
TIM	Technical Interchange Meeting
TMDE	Test Measurement and Diagnostic Equipment
TMP	Test Management Plan
TMU	Traffic Management Unit
TP	Transition Plan
TRACS	Transportable Radar Analysis Computer
TTY	Teletype
UDS	Universal Data Set
VMCP	Virtual Machine Control Program
VRTM	Verification Requirements Traceability Matrix
VSCS	Voice Switching and Control System

APPENDIX 2. APPLICABLE DOCUMENTS

Number	Title
ORDER 1100.134A	Maintenance of National Airspace System Automation Subsystems
ORDER 1320.1C	FAA Directive System
ORDER 1380.33B	Air Traffic Staffing Standards System
ORDER 1380.40B	Airway Facilities Sector Level Staffing Standard Program
ORDER 1800.58	NAS Integrated Logistics Support Policy
ORDER 1800.8E	NAS Configuration Management
ORDER 1810.4A	FAA Test Policy
ORDER 3400.17	Personnel Certification
ORDER 4620.3	Initial Support for New or Modified Equipment Installation
ORDER 4630.2A	Standard Allowance of Supplies and Working Equipment for NAS Facilities
ORDER 4650.21B	Management of In-Use Personal Property
ORDER 4650.7	Management of Project Material
ORDER 4660.1	Real Property Handbook
ORDER 4800.2A	Utilization and Disposal of Excess and Surplus Personal Property
ORDER 6000.15A	General Maintenance Handbook for Airway Facilities
ORDER 6000.27A	Transition of Maintenance Philosophy Report
ORDER 6000.5A	Facility Master File
ORDER 6020.A	F&E Program Physical Status Reporting System
ORDER 6030.32	Maintenance of NAS Equipment Under Test
ORDER 6030.45	Facility Reference Data File (JAI, Commissioning, & Decommissioning)
ORDER 6032.1	Modification to FAA Ground Facilities, Systems and Equipment in the NAS
ORDER 6040.15	NAS Performance Reporting System
ORDER 6100.1	Data Processing Equipment Modification Handbook
ORDER 6110.1	Electronic Equipment Modification Handbook
ORDER 6200.4B	Test Equipment Management Handbook
ORDER 6210.1	Airways Facilities Service Test Equipment Calibration Programs
ORDER 6350.12	Subsystem Integration Test Procedures
ORDER 6950.2C	Electrical Power Policy Implementation at NAS Facilities
ORDER 7210.3	Facility Operation and Administration Handbook
AAS-AP-ISSS-01	AAS ISSS Branch Management Plan
ESN	Executive Summary Network 4/15/89
FAA-DT-AAP-003	AAS Demonstration and Test Requirements
FAA-ER-130-005H-AP	AAS System Level Specification
FAA-SOW-240-002	AAS Statement of Work
FAA-STD-020A	Transient Protection Shielding and Bonding of Equipments
FAA-STD-024A	Preparation of T&E Plans and Procedures
FAA-STD-034	Preparation of Logistics Support Analyses Record (LSAR) Data
FAA-STD-036	Preparation of Project Implementations Plans
FAA-TRO-AAP-003	AAS Transition Concept and Requirements
ICD-NAS-MD-700	CDC/CCC
ICD-NAS-MD-720	SMMC
ICD-NAS-MD-742	DRG/DARC
MIL-STD-1388	Logistics Support Analysis/Record
MIL-STD-1561	Provisioning Procedures
NAS-1800	Program Deployment Readiness Review 3/25/88 Draft
NAS-MD-110	ADL Test Terms and Definitions
NAS-SR-1000	NAS Systems Requirements Specifications
NAS-SS-1000	NAS Systems Specification

Number	Title
CDRL #AT01	
UDI-AAP-055	Site Activation Plan (SAP)
CDRL #AT02	
UDI-AAP-092	Site Preparation Design Information Package (SPDIP)
CDRL # AT03	
UDI-AAP-093	Site Readiness Review Report (SRRR)
CDRL #AT05	
UDI-AAP-134	Transition Plan

APPENDIX 3. MAC TO CALENDAR CONVERSION

AAS AP RFP Months After Contract
Award Date - July 1988 - Start Date Nov. 1988

MAC	Month	Year	MAC	Month	Year	MAC	Month	Year	MAC	Month	Year
1	December	1988	36	November	1991	72	November	1994	108	November	1997
2	January	1989	37	December	1991	73	December	1994	109	December	1997
3	February	1989	38	January	1992	74	January	1995	110	January	1998
4	March	1989	39	February	1992	75	February	1995	111	February	1998
5	April	1989	40	March	1992	76	March	1995	112	March	1998
6	May	1989	41	April	1992	77	April	1995	113	April	1998
7	June	1989	42	May	1992	78	May	1995	114	May	1998
8	July	1989	43	June	1992	79	June	1995	115	June	1998
9	August	1989	44	July	1992	80	July	1995	116	July	1998
10	September	1989	45	August	1992	81	August	1995	117	August	1998
11	October	1989	46	September	1992	82	September	1995	118	September	1998
12	November	1989	47	October	1992	83	October	1995	119	October	1998
13	December	1989	48	November	1992	84	November	1995	120	November	1998
14	January	1990	49	December	1992	85	December	1995	121	December	1998
15	February	1990	50	January	1993	86	January	1996	122	January	1999
16	March	1990	51	February	1993	87	February	1996	123	February	1999
17	April	1990	52	March	1993	88	March	1996	124	March	1999
18	May	1990	53	April	1993	89	April	1996	125	April	1999
19	June	1990	54	May	1993	90	May	1996	126	May	1999
20	July	1990	55	June	1993	91	June	1996	127	June	1999
21	August	1990	56	July	1993	92	July	1996	128	July	1999
22	September	1990	57	August	1993	93	August	1996	129	August	1999
23	October	1990	58	September	1993	94	September	1996	130	September	1999
24	November	1990	59	October	1993	95	October	1996	131	October	1999
25	December	1990	60	November	1993	96	November	1996	132	November	1999
26	January	1991	61	December	1993	97	December	1996	133	December	1999
27	February	1991	62	January	1994	98	January	1997	134	January	2000
28	March	1991	63	February	1994	99	February	1997	135	February	2000
29	April	1991	64	March	1994	100	March	1997	136	March	2000
30	May	1991	65	April	1994	101	April	1997	137	April	2000
31	June	1991	66	May	1994	102	May	1997	138	May	2000
32	July	1991	67	June	1994	103	June	1997	139	June	2000
33	August	1991	68	July	1994	104	July	1997	140	July	2000
34	September	1991	69	August	1994	105	August	1997	141	August	2000
35	October	1991	70	September	1994	106	September	1997	142	September	2000
			71	October	1994	107	October	1997	143	October	2000
									144	November	2000

APPENDIX 4. - ENDNOTES

FOR CHAPTER 3

SLS - Refers to AAS System Level Specification FAA-ER-130-005H-AP, 28 August 1987.

1.	DRG/PAM/HOST Configuration Diagram - Advanced copy of AT05 dated 03/01/90		Fig. 30-1
2.	IBID.		Fig. 30-2
3.	SLS	System Configuration	50.3.2.1.1
4.	SLS	System Configuration	50.3.2.1.1
5.	PAMRI TIM 5/22/89.		
6.	PAMRI TIM 5/22/89.		
7.	PAMRI TIM 5/22/89.		
8.	SLS	GPI Interface	50.3.7.1.2.1
9.	SLS	GPI Interface	50.3.2.1.2.2
10.	SLS	GPO Interface	50.3.7.1.2.2
11.	SLS	GPO Interface	50.3.2.1.2.1
12.	SLS	INTI Interface	50.3.7.1.2.3
13.	SLS	INTI Interface	50.3.2.1.2.4
14.	SLS	INTO Interface	50.3.7.1.2.4
15.	SLS	INTO Interface	50.3.2.1.2.5
16.	SLS	Radar Interface	50.3.2.1.2.6
17.	SLS	Radar Interface	50.3.7.1.2.5
18.	SLS	Host Interface	50.3.1.4.1
19.	SLS	Host Interface	50.3.2.1.2.1
20.	SLS	Transition Requirements	50.3.1

FOR CHAPTER 5

1. Refer to the Memorandum of Understanding between the Air Traffic Service, the Advanced Automation Program Office, the Systems Engineering Service, and Program Engineering and Maintenance Service for Validation of ATC Requirements Related to Transition, dated 9/2/83. This document assigns certain responsibilities to APM. APM-250 became the organization with primary responsibility for the APM TRVT. After the reorganization of 1987, APM-250 became AAP-240. The responsibility for the APM TRVT stayed with the same organization and is now referred to as the AF TRVT.

2. National Airspace Integrated Logistics Support (NAILS) Master Plan, March 1987, par 19.

3. FAA-STD-036, Preparation of Project Implementation Plans, 11 March 1987, Appendix 1.

4. FAA-STD-024a (Draft) Preparation of Test and Evaluation Plans and Test Procedures, 10 September 1986, Appendix 1, 103.1.

5. Ibid.

6. Ibid.

7. Ibid.

8. Ibid.

9. Ibid.

10. AAS System Level Specification, FAA-ER-130-005H-AP, 28 August 1987, Paragraph Number, 4.2.1, second subparagraph.

11. FAA-STD-024a (Draft) Preparation of Test and Evaluation Plans and Test Procedures, 10 September 1986, Appendix IV.

12. OT&E Program Plan, SEI/SRSA, 5 November 1987, par. 1.2.

13. OT&E Program Plan, SEI/SRSA, 5 November 1987, par. 1.3.

14. Advanced Automation System Logistics Support Plan, (Draft), October 1987, par. 2.0.

15. Ibid, par. 3.0.

16. Ibid, par. 4.0.

17. Ibid, par. 5.0.

18. Ibid, par. 6.0.

19. Ibid, par. 7.0.

20. Ibid, par. 8.0.

21. Ibid, par. 9.0.

22. Ibid, par. 9.0.

23. Ibid, Appendix C.

24. Ibid, Appendix D.

25. National Airspace Transition Plan, Volume 1, (Draft), December 1986, Executive Summary.

26. AAS Data Item Description Acquisition Phase, FAA-DID-240-002, 28 August 1987, UDI-AAP-093.

27. AAS Data Item Description Acquisition Phase, FAA-DID-240-002, 28 August 1987, DI-S-4177B.

FOR CIIAPTER SIX

1.	RFP PAMRI Support Service Amend 0004	para. B.3.2
2.	RFP PAMRI Training Services Amend	Para. B.20.2
3.	RFP PAMRI Consumable Amend III 3/11/88	Para. B.24.2
4.	RFP PAMRI Spares Amend II 3/11/88	Para. B.28.2

FOR CHAPTER 7

1. IBM CDRL-AT-02, Vol. 1, 4/1/89, Site Preparation Design Information Package (SPDIP).

2. NCP 12202 Adapter Quantities 11/89.

3. IBM# Technical Interchange Meeting 1/21-22/89 Radar Modem Splitter Cabling.

4. IBM# PMR Transition Cabling 12/16/89.

5. IBM# Technical Interchange Meeting 1/21/-22/89 GPO/GPI Cabling.

6. IBM# Technical Interchange Meeting 1/21-22/89 INTO/INTI Cabling.

IBM data provided as noted. There are some minor modifications to adapt for PIP use.

FOR CHAPTER 8

SLS - Refers to AAS System Level Specification FAA-ER-130-005H-AP, 28 August 1987.
SOW - Refers to AAS Statement of Work Acquisition Phase FAA-SOW-240-002, 28 August 1987

1.	FAA-340-003 AAS Statement of Work with DCN 005 May 88, Paragraph 3.6.3, and DTFAO1-88-R-00205 AAS Model Contract June 14, 1988 Line Item B.2.2.		
2.	Ibid.	SOW Paragraph 3.6.3.2 CLIN Line Item B.300	
3.	Ibid.	Endnote #1.	
4.	SOW	Test and Eval. Program	3.6
5.	ADL	Test Terms and Definition March 85	7
6.	Ibid.		
7.	SLS SOW	Factory Partial Tests Factory Partial System Tests	50.4.4.1.1 3.6.3.1.1
8.	SLS	Hardware Tests	4.4.1.1.4.1
9.	SLS	Hardware Tests	50.4.4.1.1.1
10.	SLS	Fabrication Inspection	50.4.4.1.1.1.1
11.	SLS	Mechanical Inspection	50.4.4.1.1.1.1.1
12.	SLS	Electrical Inspection	50.4.4.1.1.1.1.2
13.	SLS	Software Tests	50.4.4.1.1.2
14.	SLS	Diagnostics	50.4.4.1.1.2.1
15.	SLS	System Build Support SW Tests	50.4.4.1.1.2.2
16.	SOW	Factory Full System Tests	3.6.3.1.2
17.	SOW SLS	First Article Testing Testing Non-commercial Hardware	3.6.3.1.4 4.4.3
18.	SLS SOW	Factory System Qual. Tests Factory System Qual. Tests	50.4.4.1.2 3.6.3.1.3
19.	SLS	System Tests	4.1.1.2
20.	SOW	Test Management	3.6.2
21.	SOW SLS SLS	ACT Testing ACT Inst. and Integ. Installation and Integration	3.6.3.2 50.4.4.2.1 4.4.1.1.1
22.	SLS	Installation and Integration Test	50.4.4.2.1
23.	SLS	Installation and Checkout	4.4.1.1.1.1
24.	SLS	Transition Requirements	50.3.1.6
25.	SLS	See 23	50.3.1.6

26.	SLS	See 23	50.3.1.6
27.	SLS	Electro Magnetic Radiation	4.4.1.1.1.3.1
28.	SOW SLS	FAA Technical Center System Tests ACT System Tests	3.6.3.2.2 50.4.4.2.2
29.	SLS Host Baseline Tests		50.4.4.2.2.1
30.	SLS	Host Operational Monitor Tests	50.4.4.2.2.2
31.	Functional Tests		50.4.4.2.2.3
32.	SLS	Failure/Recovery/Tests	50.4.4.2.2.4
33.	SLS	Capacity and Response Time Tests	50.4.4.2.2.5
34.	SLS	On-line Certification Test	50.4.4.2.2.6
35.	SLS	Failure Mode Tests	50.4.4.2.2.7
36.	SLS	Maintenance Tests	50.4.4.2.2.8
37.	SLS	EDARC Tests	50.4.4.2.2.10
38.	SLS	Stress Tests	50.4.4.2.2.11
39.	SLS	Site Simulation Tests	50.4.4.2.2.13
40.	SLS	Support Software Tests	50.4.4.2.2.14
41.	SOW SLS	Technical Center Acceptance Tests Technical Center Acceptance Test	3.6.3.2.3 50.4.4.2.3
42.	SLS	HCS Interface	50.3.1.4.2
43.	SLS Peripheral Device Interface		50.3.1.4.2
44.	NAS-MD-110 May 87	Section 5	
45.	NAS-MD-110 May 87	Section 5	
46.	NAS-MD-110 May 87	Section 6	
47.	NAS-MD-110 May 87	Section 6	
48.	SOW	Site Testing	3.6.3.3
49.	CDRL AT05 Vol. I, PAMRI Transition Plan, dated 3/1/90.		
50.	CDRL AT05 Vol. I, PAMRI Transition Plan, dated 3/1/90.		
51.	SLS	System Test	50.4.4.3.2
52.	CDRL AT05 Vol. I, PAMRI Transition Plan, dated 3/1/90.		
53.	Order 6040.15 November 4, 1981 National Airspace Performance Reporting System (NAPRS)		
54.	Order 6000.15A General Maintenance Handbook for Airways Facilities, October 5, 1981, Par. 147		
55.	Order 6000.15A General Maintenance Handbook for Airways Facilities, October 5, 1981, Par. 148		

56. AAS System Level Specification Par. 3.5.4.3.3

57. Order 6000.15A General Maintenance Handbook for Airways Facilities, October 5, 1981, Par. 154

58. CDRL AT05 Vol. I, PAMRI Transition Plan, dated 3/1/90.

59. CDRL AT05 Vol. I, PAMRI Transition Plan, dated 3/1/90.

60. Order 6030.45 Facility Reference Data File - Feb. 1987 Par.401

61. Order 6030.45 Facility Reference Data File - Feb. 1987 Par. 403.a.(z)

62. Order 6030.45 Facility Reference Data File - Feb. 1987 Par. 405.(a)

63. Order 6030.45 Facility Reference Data File - Feb. 1987 Par. 405.(g)

64. Order 6030.45 Facility Reference Data File - Feb. 1987 Par. 500

65. Order 6030.45 Facility Reference Data File - Feb. 1987 Par. 501

66. Order 6030.45 Facility Reference Data File - Feb. 1987 Par. 405.(j)

FOR CHAPTER 9

SLS - Refers to AAS System Level Specification FAA-ER-130-005H-AP, 28 August 1987.
SOW - Refers to AAS Statement of Work Acquisition Phase FAA-SOW-240-002, 28 August 1987.

1.	SLS	Maintenance Concepts	3.5.4.1.1
2.	SLS	Relationship to Other Documents	3.5.1
3.	SOW	Integrated Logistics Support	3.5
4.	National Airspace Integrated Logistics Support Management Team (NAILSMT)		3.5.1.1
5.	SOW	Logistics Support Analysis (LSA)	3.5.4
6.	SOW	LSA Candidate Selection	3.5.4.2
7.	SOW	FAA Depot Maintenance Analysis	3.5.4.7
8.	SOW	Manpower and Personnel	3.5.4.8
9.	SLS	Hardware Maintenance Requirements and Analysis	3.5.4.1.2
10.	SLS	Periodic Maintenance	3.5.4.1.3
11.	SLS	Corrective Maintenance	3.5.4.1.4
12.	Advanced Automation System Logistics Support Plan (Draft) October 1987		5.1
13.	SLS	National Field Support Group	3.5.4.4
14.	Advanced Automation System Logistics Support Plan (Draft) October 1987		5.2
15.	SLS	Software Maintenance Staffing	3.5.4.5.5.1
16.	SLS	RFP Section B	B.3
17.	SLS	RFP Section B	B.33, B.34, B.35
18.	SOW	Support and Test Equipment	3.5.7
19.	SLS	Support Tools	3.5.4.5.5.2